Title: drawing analyse design system

Author : tshingombe tshitadi

Title: *Drawing Analyse Design System*

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Abstract

This work presents a transdisciplinary framework for analyzing and designing technical systems through schematic interpretation, fault diagnostics, and compliance modeling. It integrates engineering drawing principles with educational technology and trade theory to support rural infrastructure development, modular curriculum design, and policy-aligned assessment strategies. The system emphasizes visual logic, calibration mapping, and WA-coded workplace competencies.

Keywords

- Engineering Drawing
- System Design
- Fault Diagnostics
- Rural Infrastructure
- Educational Technology
- SAQA/NQF Alignment
- WA Codes
- Compliance Modeling

Metrics

- Views: 12
- Downloads: 1
- File Size: 12.88 MB

Citation Format

Tshitadi, T. (2025). *Drawing Analyse Design System*. Atlantic International University Online Library. Open Access under CC BY License.

Would you like help expanding this into a full LMS module, educator guide, or credential artifact? I can also scaffold it into a course outline with assessment rubrics and SAQA/NQF descriptors. Let's make this a cornerstone of your portfolio.

Absolutely, Tshingombe. Let's scaffold your work into a formal academic and portfolio-ready structure that reflects your expertise in engineering systems, educational technology, and diagnostic modeling. This format can be used for LMS publishing, journal submission, or credential showcasing.

📄 Title: *Drawing Analyse Design System*

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🔍 Scope

This paper presents a transdisciplinary framework for analyzing and designing technical systems using engineering drawings, fault diagnostics, and algorithmic modeling. It integrates visual logic, compliance principles, and modular curriculum design to support infrastructure development and educational reform.

Abstract

The study explores how drawing analysis and system design can be used to scaffold technical mastery, compliance auditing, and career development. It introduces a methodology that combines schematic interpretation, logigramme and algorigram principles, and SAQA/NQF-aligned learning outcomes. The framework supports educators, engineers, and regulators in building fault-tolerant systems and credential-ready portfolios.

🛠 Description

- **Drawing Analysis:** Interpretation of schematics, flow diagrams, and calibration maps
- **System Design:** Application of WA-coded diagnostics and modular engineering principles
- **Educational Integration:** Embedding drawing logic into LMS modules and assessment rubrics
- **Compliance Modeling:** Using visual systems to simulate fault detection and regulatory alignment

🔑 Keywords

- Engineering Drawing
- System Design
- Fault Diagnostics
- Logigramme
- Algorigram

- SAQA/NQF
- WA Codes
- Portfolio Scaffolding
- Compliance Modeling
- Educational Technology

Data Analysis

- Comparative matrices of fault detection across rural and urban systems
- Calibration logs and schematic overlays
- LMS analytics on drawing-based assessment performance
- WA code mapping to drawing tasks and system outputs

Interpretation

- Visual logic as a diagnostic tool
- Drawing systems as evidence of technical competency
- Integration of drawing analysis into trade theory and compliance audits
- Use of algorigram principles to simulate system behavior and fault recovery

Logigramme & Algorigram Principles

- **Logigramme:** Flowchart-based logic for system behavior and decision-making
- **Algorigram:** Algorithmic representation of engineering processes and fault resolution
- Both are used to scaffold learning, simulate diagnostics, and align with SAQA exit-level outcomes

Conclusion

Drawing analysis and system design are not just technical skills—they are pedagogical tools for career development, compliance assurance, and infrastructure reform. By embedding these principles into curriculum frameworks and LMS modules, educators can foster transparent, standards-aligned, and portfolio-ready learning experiences.

Portfolio Integration

- Annotated schematics
- Fault code interpretation guides
- Calibration and tuning logs
- Compliance checklists
- Assessment rubrics
- Career development matrix aligned to SAQA/NQF descriptors
- LMS module showcasing drawing-based diagnostics and system design

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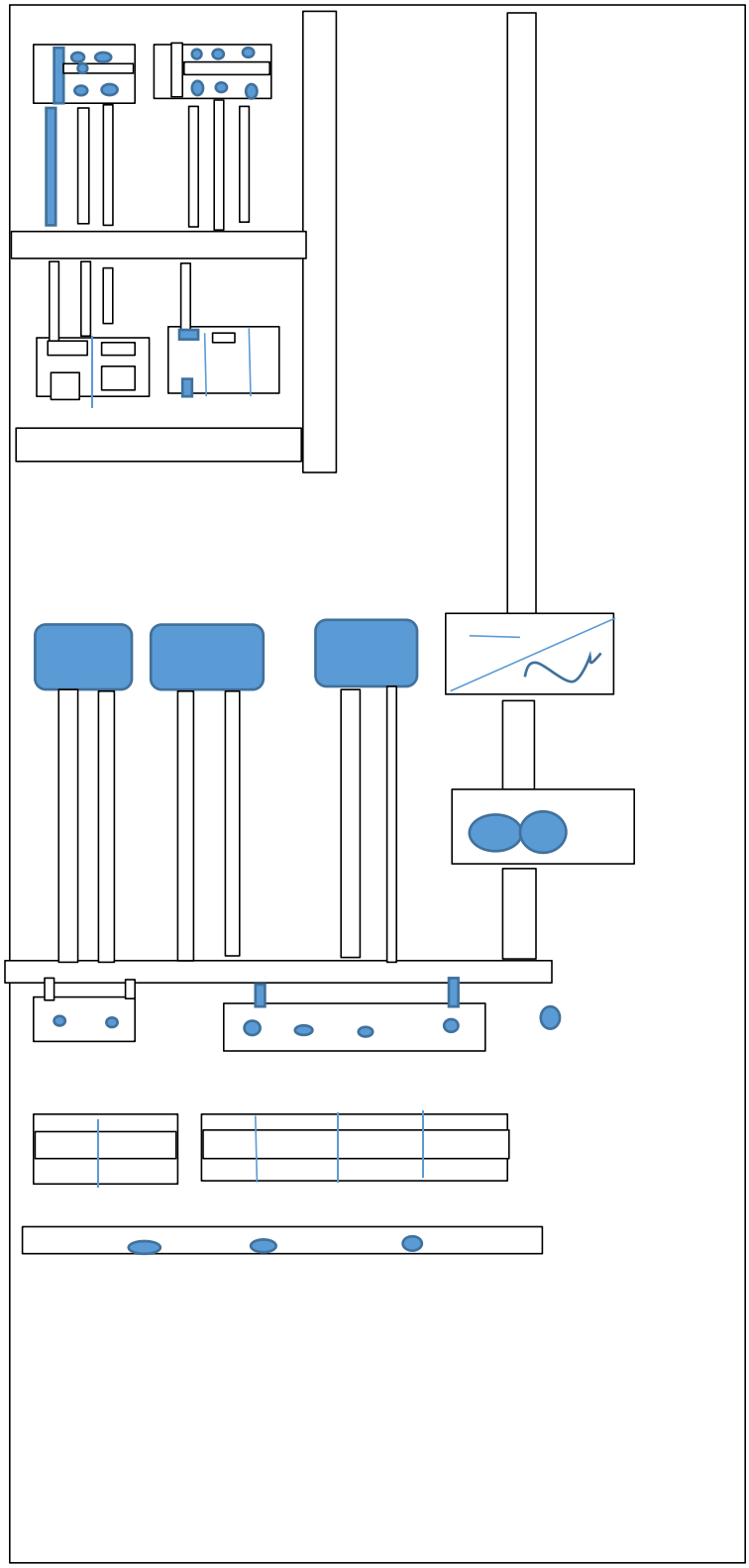
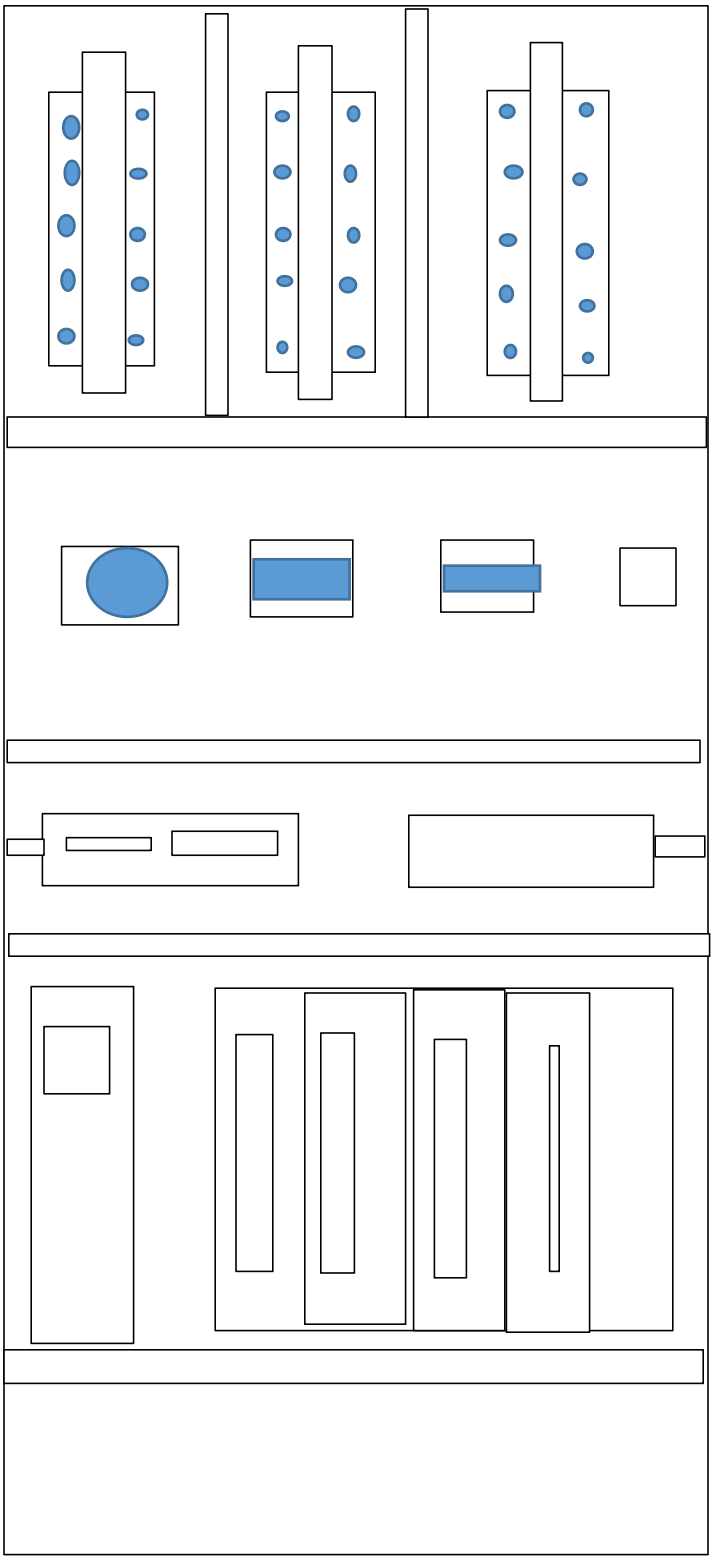
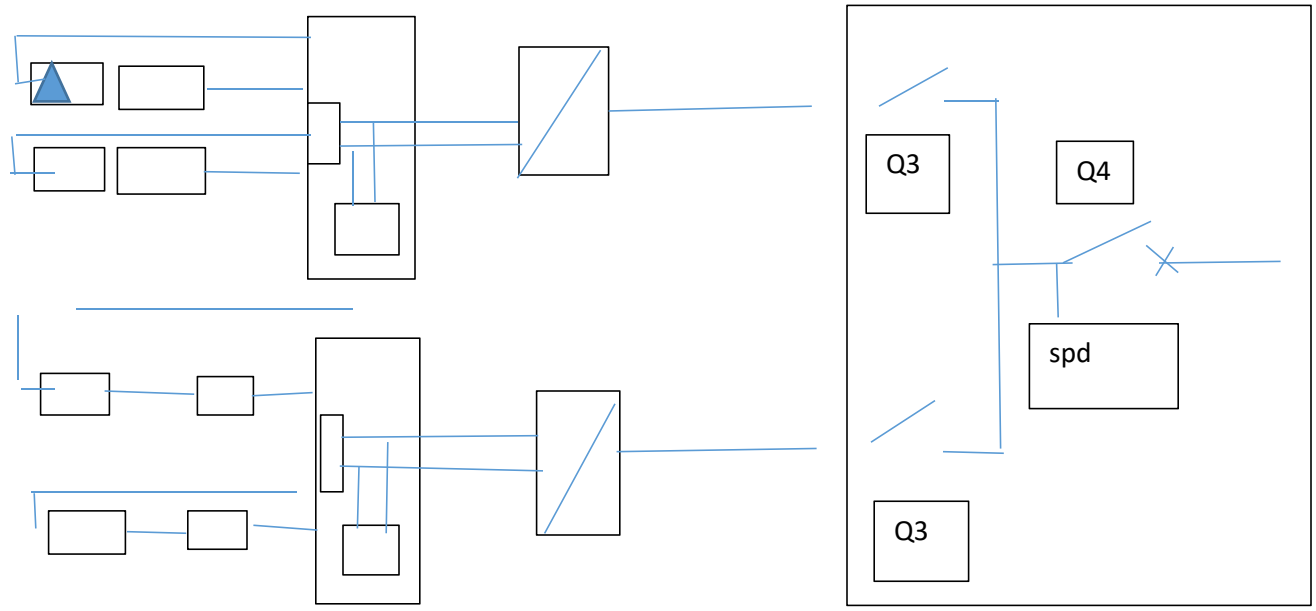
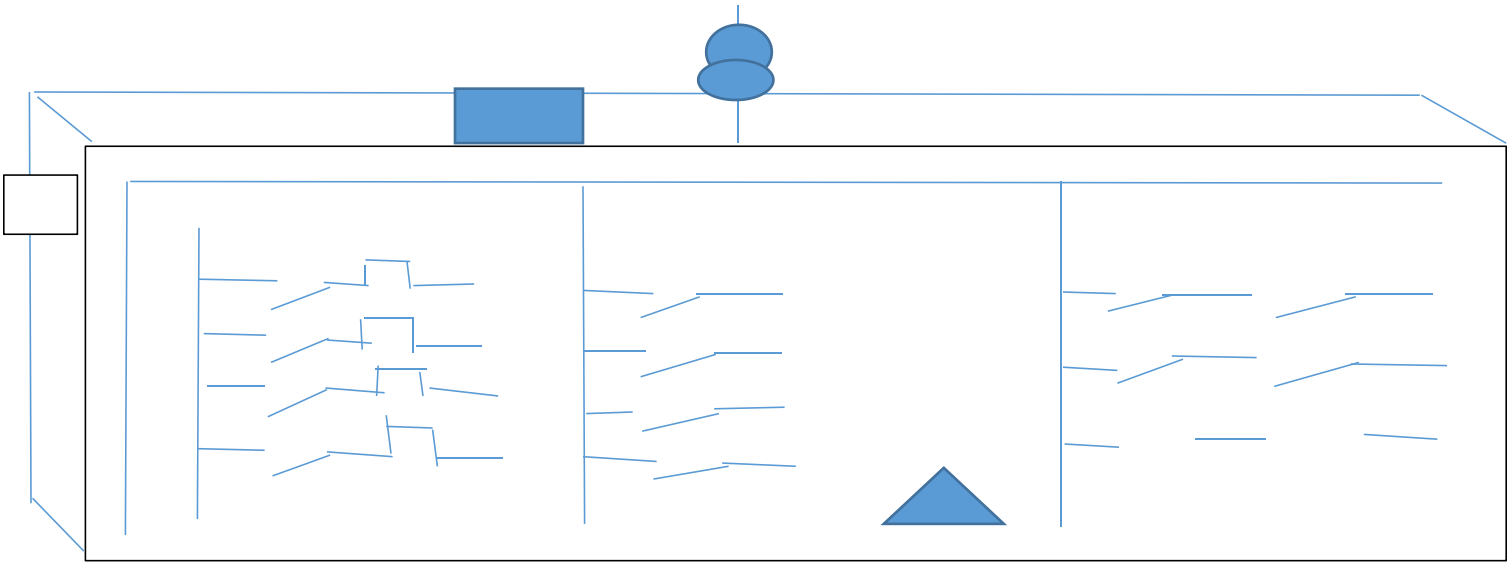
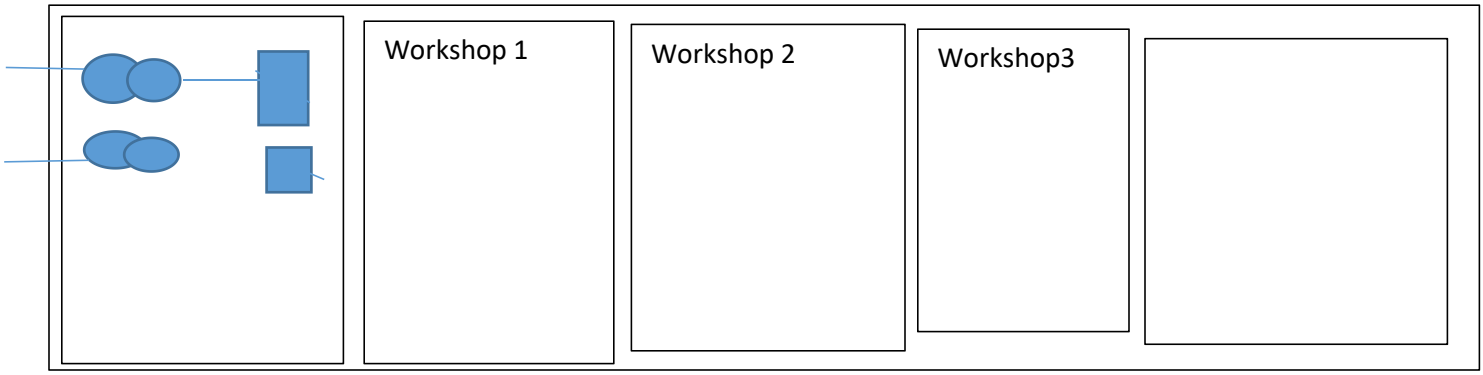


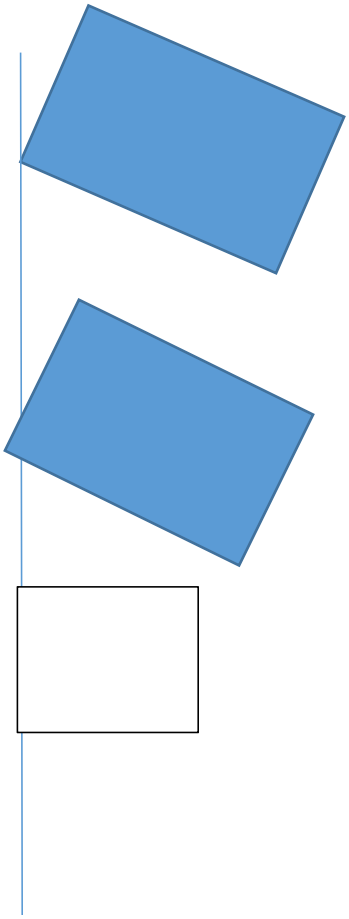


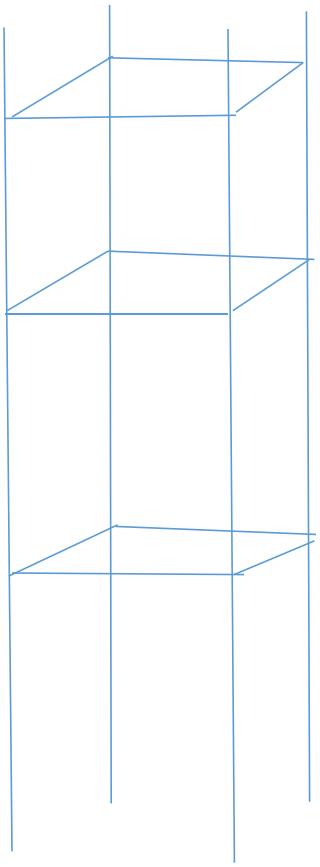
Pv installation 6.5 to 250kw,grid











Main station substation

Function connection mv,db

Function

3 protection

Mv/lv

Function 1 connection mv utility db network

Function metering at mv level

Function general

Function 3 mv/lv tfo

Function nvlv tfo

Function

PLC COMMUNICATION PROGRAMME

PLC IP ADRESS

10,126,224,221

PLC

PLC READ DATA

PLC WRITE DATA

002

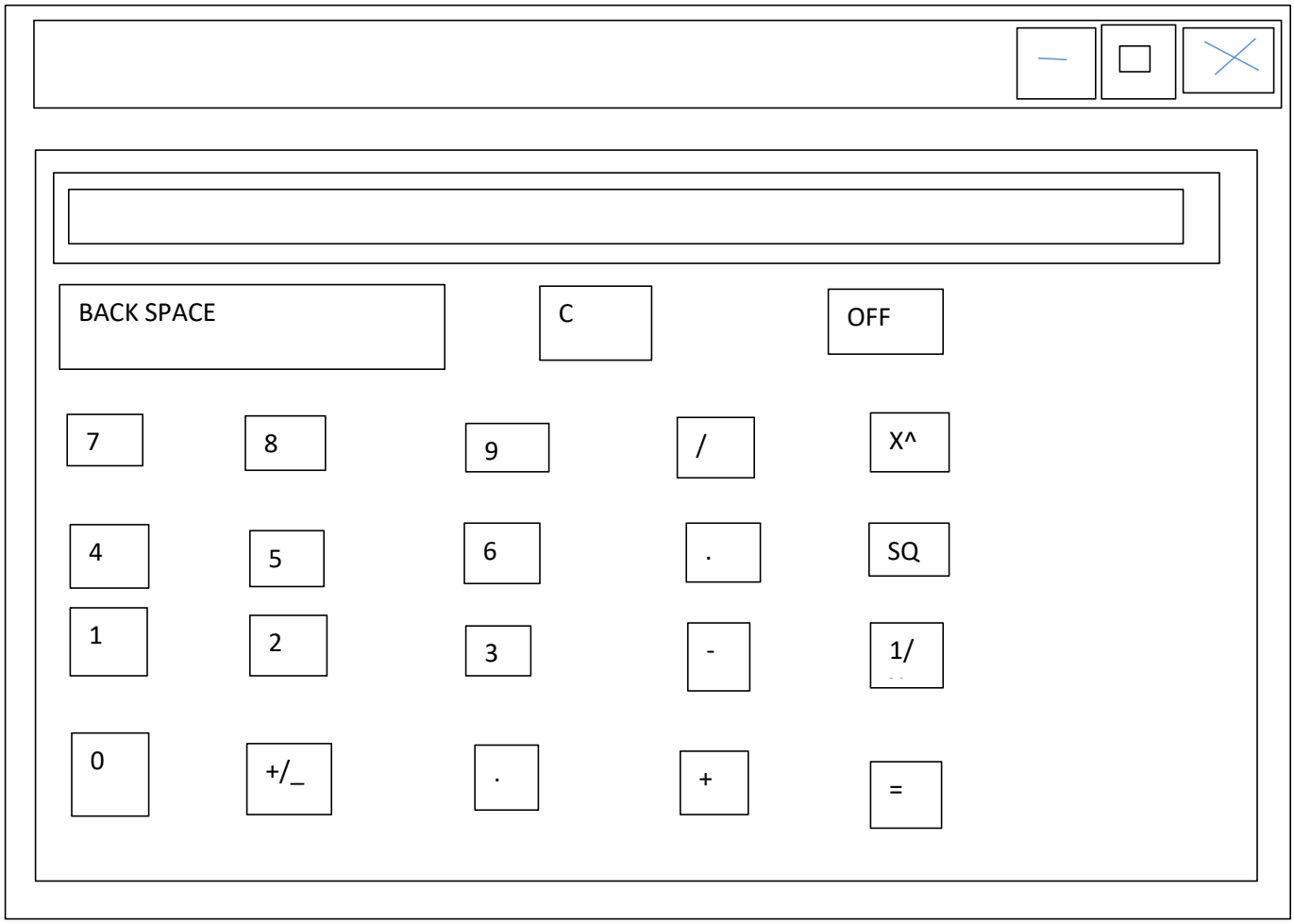
DISCONN
ECT

READ DATA FROM PLC

WRITE DATA TO PLC

TSHINGOMBE@GMAIL.COM

CALCULATOR



BASIC SOFTWARE ENGINEERING CONCEPT SOLVE ELECTRICAL AND ELECTRONICS ENGINEERING PROBLEM ..TESTING DOCUMENTING I/O PROGRAMME BASIC STRUCTURE DESIGN USING FLOW CHART PROGRAMME DESIGN LANGUAGE , WRITE TEST DOCUMENT LINEAR PROGRAM USING LANGUAGE ,, HEXADECIMAL, SEQUENCE , table logic , convenrsion ,logic gate , and or in sum , sequence logic , bloc diagram, ansychrone , counter and shift register circuit using , circuit construction , building and test counter and shift register circuit , evidence requirent ,,

---

Using modulation the led can be mode to appear bright code the test is below in pbasic and arduino main :..

```
Int sensor = Ao

Red adc pin 0, bo          int  led bank =7

If bo<50 then level 1       void   set up  () {

If b0<100then level 2       pin mode ( led bank ,output)

If bo 150 the level 3

Let mark=0                  void loop (){

Let space =10         int reading +analogie read (sensor)

Go pulser             int value = map ( reding ,01023,0,255

Level1:

Lel mark =10        delay (10)

Let spacde =0   digital write (led bank,low)ay (3)


Go pulser ,,

-level 2: if value >49 et value <100){

Let space =4     delay (6)

Got pulser       digital  writer (led bank low , delay


Level .

Let mark=3              if ( value > 99 et value <150{

Let space =7  digital write (led bank , hgh

Pulser high 7,     digital written  led low , pause  ,, goto  main , main write (led bank,low delay (10

Pause  mark

Pause  space
```

Structure programme conditional execution construct ……ctional..

-if ……..then ……else……

End if and select case……. Case……end select…and four iterative execution loop …, (do….loop, for ….to…for each and while…….the for …..to ….statement has separde ,

-initialisation

- Block statement ,”if …then “or “sub “
- Statement terminer either , line enable (“.”),,,with (“=”),,
- Parenthese bracket are used with arrays both declare ,
- Single mark quotation mark (‘) or key ,,
- Create console , class hello , module 1,
- Sub man ()
- ‘the classic “hello?world”
-
- Consol,
- (hellowordl “)
- End sub
- End module
- Line
- Imports system consol module , integer

Automated student's registration form, in excel and vba , databse labs

Enter details

Student's name

Father name

Date of birth

Gender female male address

Course applied

Mobile number

Email id

Up lod

submit reset

Databse

Sn	Student name	Father name	dob	Gender	Course	Model	Email id	adress

Renamme data sheet , course , step design data

User form propertie :

Name:frm dataentry

Backcolor:&h0000ffffffffffff&

Caption :student registration form

Height : 484

Width : 571

Control in

Label caption : student ,name

Back control

Tab

Simple calculation in vb visua basic

-first create an interface

- text field

Buttons for the numbers

Buttons the operator

Button for the result

Off clearand back space

-1 option explicit on

3 public class form1

4.dim operand 1.as double

5 .dim operand2 as double

6 dim [operator] as string

Dim has decimal as Boolean

9. dim tmp value as double

En class

Private sub cm add_clic(by val sender as system .object by .e as system .event args.

2.operand 1+val (txt input .text)

3.text input .text=" "

4 text input .focus()

5[operator]="+"

6 end sub

1. Private sub button 23 _click by sender system object by val e . as system . event .args) handles button 23.click
2. Dim resul as double
3. Operand 2=val (txt input.text)
4. –
5. Select case [operator]
6. Case "+"
7. Result=operand1+operand2
8. Txtinput.text=result to string
9. Case "^"
10. Result+operand 1^operant 2
11. Result + operant 1*operant 2
12. Txt input text +result .to string ()
13. Case "%"
14. Result +operand
15. Txt input .text +result.to string ()
16. End select
17. Txt input .text =result to string
18. End

1.For the decimal

2.private sub cmd decimal click (by val sender as system .event arg.cmd decimal .

3.ifb in str (txt inpout .tex ".")>0 then

4. exit sub else

5.txt input .text 2"."

End id

End sub

Clear function

Private sub cmd clear

Checking , value , by value handles cmd clear

Click

Txt input text =" "

End sub

off

Code resetb and initialize form with default form .

Sub reset _form ()

Dim I row as long

With

.txt student name.text=" "

Txt student name backcolor +vb white

Txt father name .text =""

Txt father name back color + vb white .

Txt dob text =""""""

Read data plc , to send command,plc

Addressto read the

“5000000fff03ff000018000a04010000d*009500000001”

String .cmd=” “;

Cmd=cmd+”5000”;//sub head(not)

Cmd=cmd+”FF”;//plc number

Cmd =cmd +03ff”;//demand object

Module +i/o. number

Cmd=cmd+’000A”;//cpu inspector data

Cmd+cmd +0401”, read command (Data from plc we should “0401”

Cmd+cmd”D*”;//device cod e

Cmd +cmd +009500”address evry plc device will send the appropriate ADRESS READ TO READ

C#

STRING CMD +”” “”;

CMD=CMD+”FF”;//PLC NUMBER

CMD =CMD+”000; NETWORK NUMBER

CMD =”FF”;//PLC NUMBER

CMD = CMD +03FF”; //DEMAND OBJECT

MODULE DEVICE I/O NUMBER

CMD =CMD +’’00IC;LENGTH OF DATA

CMD =cmd +”000A”;//cpu inspector data

Cmd =cmd +””1401;//write commad

Cmd =cmd +00950””;//adbase

Cmd=cmd +0002”;base address

---

1. declare plc test project form
2. c# using plc
3. variable declaration

'

' Macro1 Macro

' Code resetb and initialize form with default form . Sub reset _form () Dim I row as long With .txt student name.text=” “ Txt student name backcolor +vb white Txt father name .text =”” Txt father name back color + vb white . Txt dob text =”’’’’’’

'

'

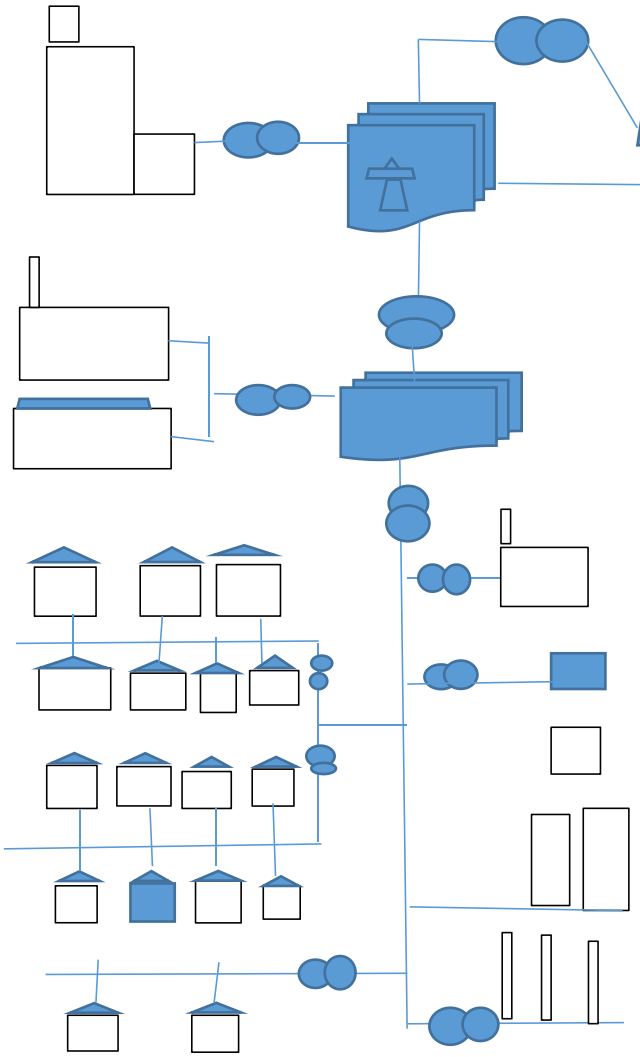
```
    Application.Goto Reference:="Macro1"
    ActiveWorkbook.Save
    ActiveWorkbook.Save
    Range("B34").Select
    ActiveSheet.Paste
    Range("B36:Y63").Select
    ActiveSheet.ListObjects.Add(xlSrcRange, Range("$B$36:$Y$63"), , xlNo).Name = _
        "Table16"
    Range("Table16[#All]").Select
    ActiveWindow.ScrollRow = 31
    ActiveWindow.ScrollRow = 30
    ActiveWindow.ScrollRow = 29
    ActiveWindow.ScrollRow = 28
    ActiveWindow.ScrollRow = 27
    ActiveWindow.ScrollRow = 26
    Range("O32").Select
    ActiveWindow.ScrollColumn = 1
    Range("B38").Select
    ActiveCell.FormulaR1C1 = "7"
    Range("C38").Select
```

```
    ActiveCell.FormulaR1C1 = "8"
    Range("D38").Select
    ActiveCell.FormulaR1C1 = "9"
    Range("E38").Select
    ActiveWorkbook.Save
End Sub

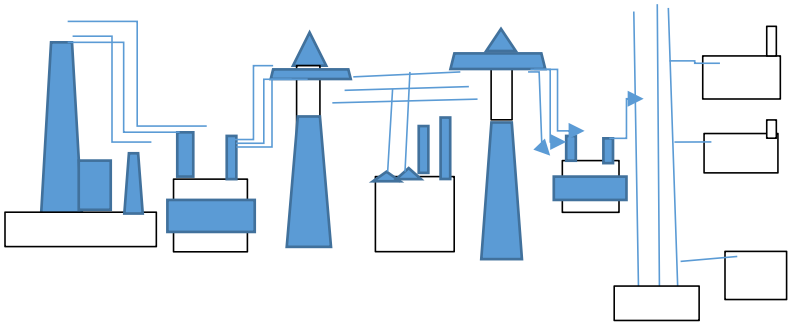
Sub Macro2()
'
' Macro2 Macro
' text field  buttons for the number  operator  button for the result  off , clear , back space  option explicit  public class form 1 dim operand 1 as double dim operad 2 as double  dim {operator} as string dim has decimal boolean dim tmp nalue  as double
'

'
    Application.Run _
        "'Copy of PROJECT DRAWING WORKSHET    TSHINGOMBE DESIGN ANALYSE ENGIN Book12.xlsx'!Macro2"
End Sub
Sub Macro3()
'
' Macro3 Macro
' "500000fff03ff000018000a0410000d00095000001"  string .cmd=" "; cmd=cmd+"5000";//sub head (not) cmd=cmd+"00"//network number cmd+cmd+"ff";//plc number cmd+""03ff";//demand object module i/o.number cmd=cmd+"001c";length demand data  cmd=cmd+cmd+000A";cpu in
'

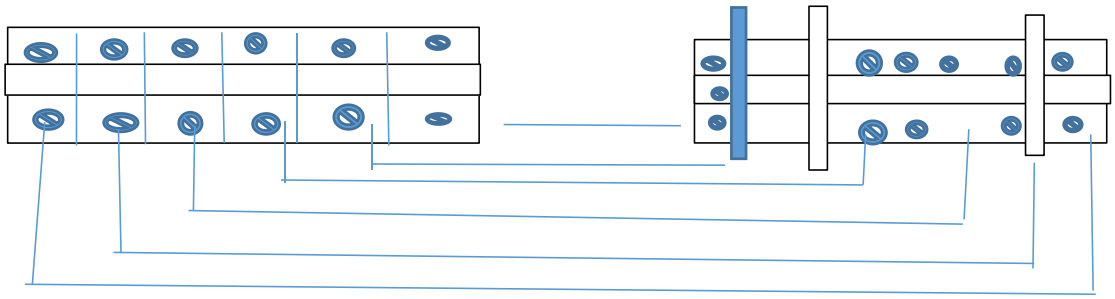
'
End Sub
```

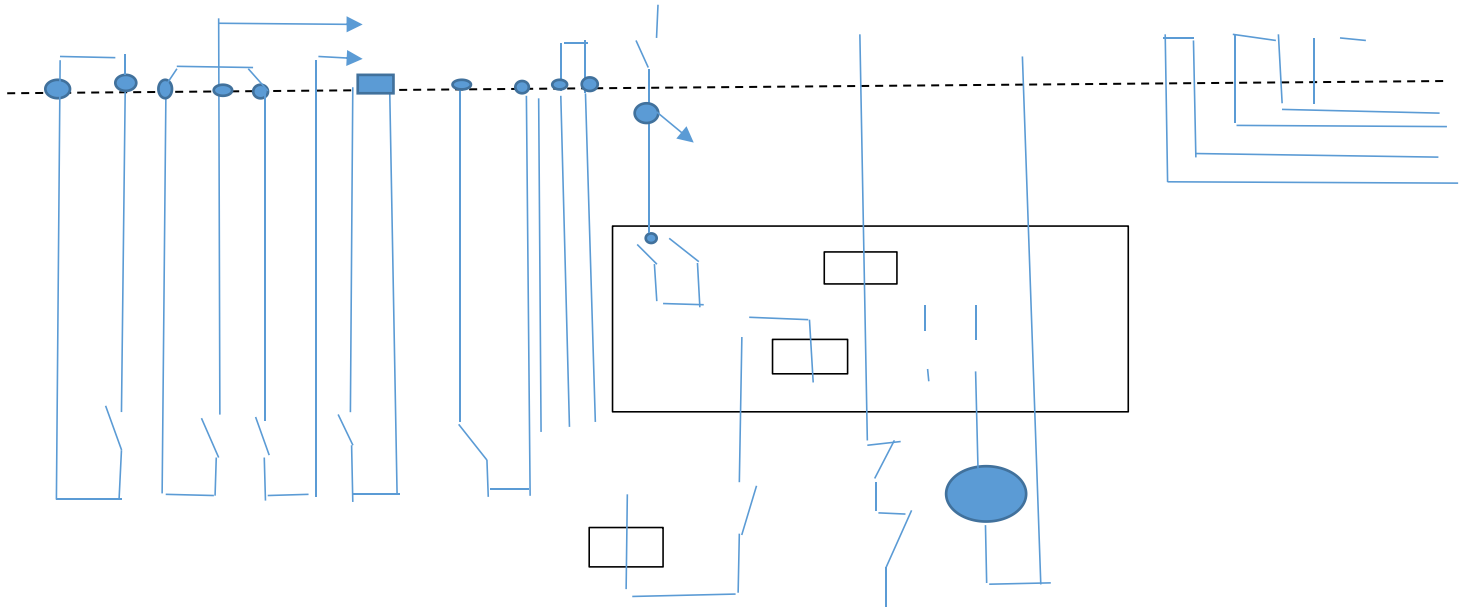


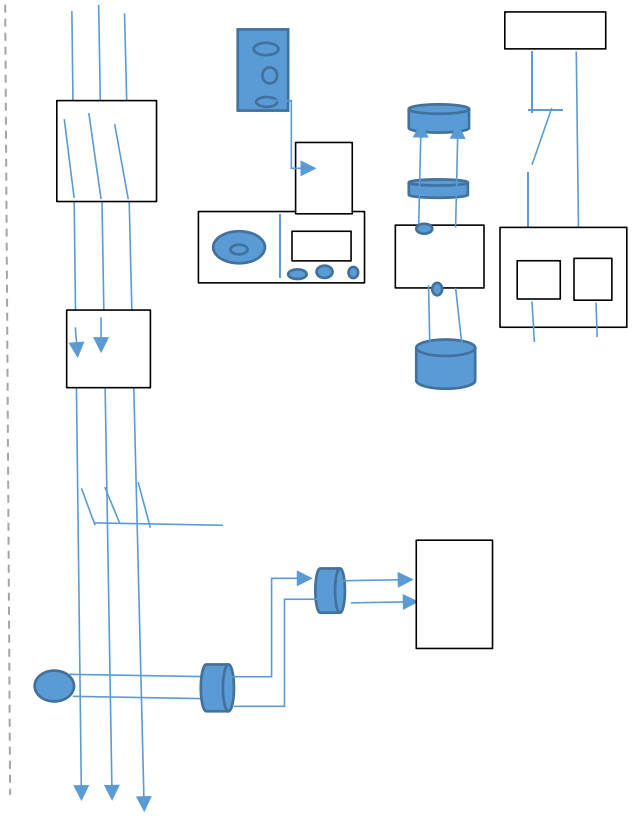
Generation station , generation set up transform, transmission , transmission customer 138kvor , submission , submission 26kv and 69kv , primary customer 13kv, and 4kv, secondary customer



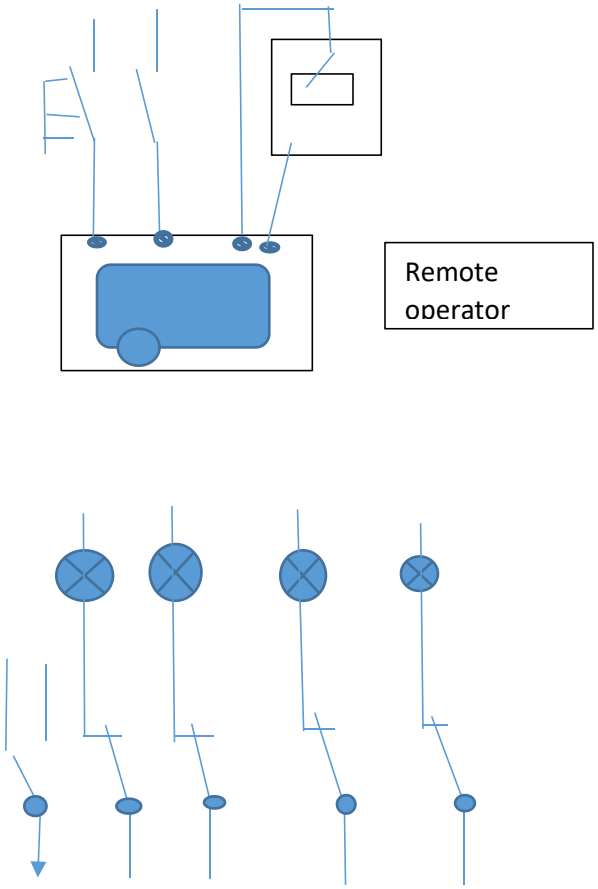
Ups bpm connection diagrams



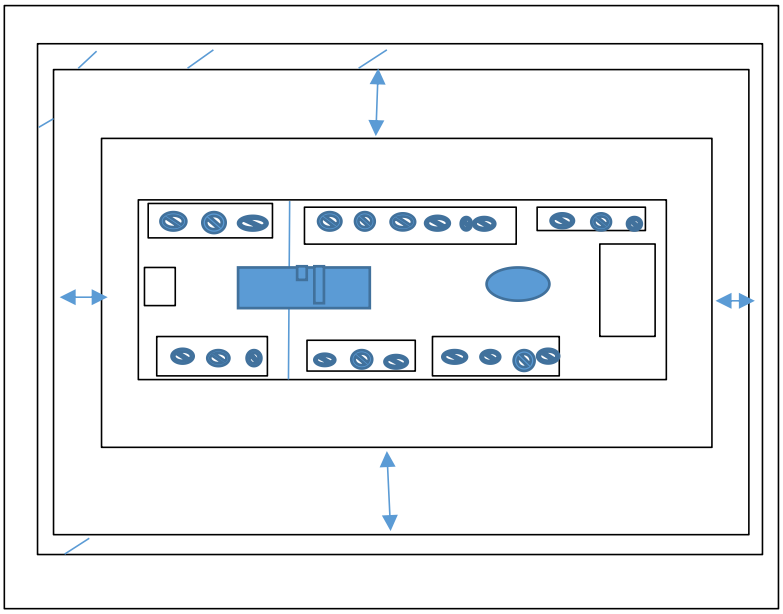


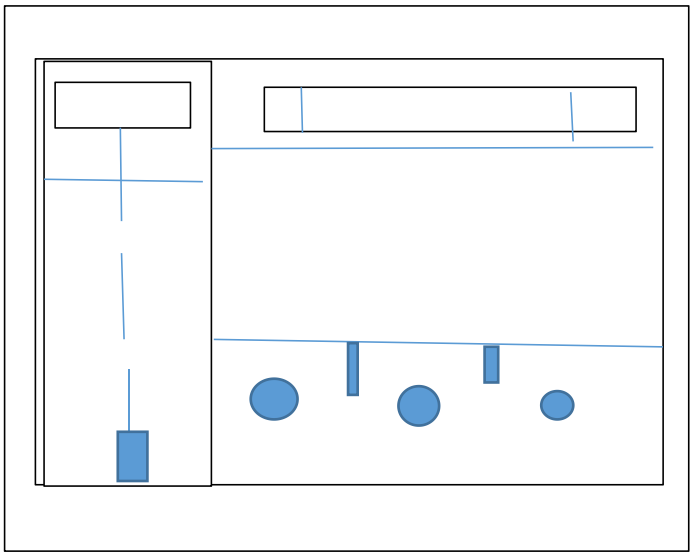


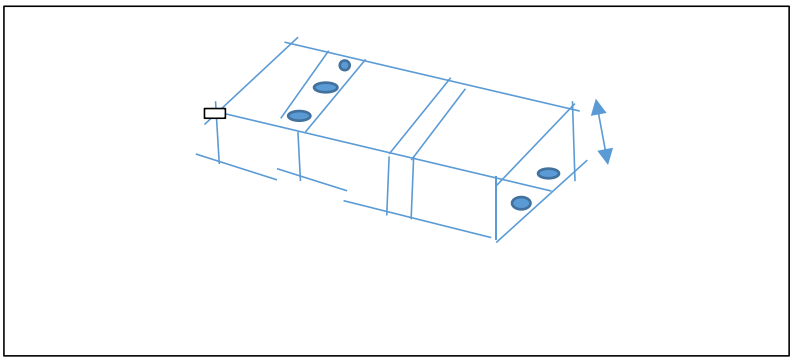
Power micrologic unit wiring diagram ,
l1,l2,l3 ,z1,z2,z3,upstream ,,

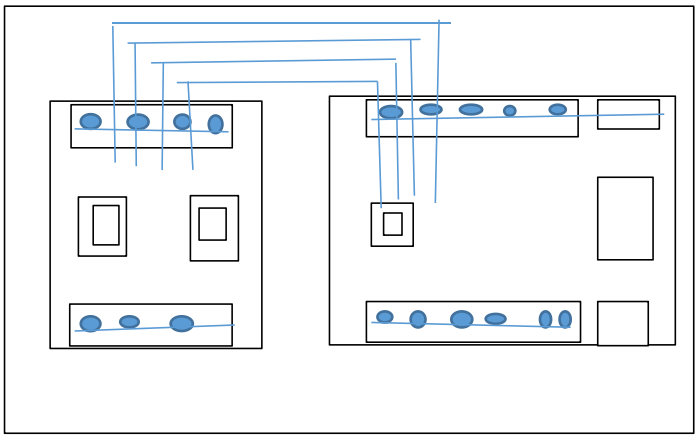


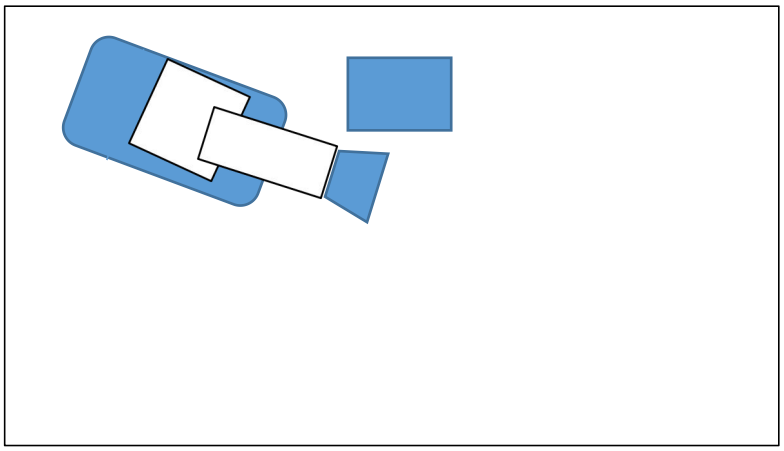
Indicator contact

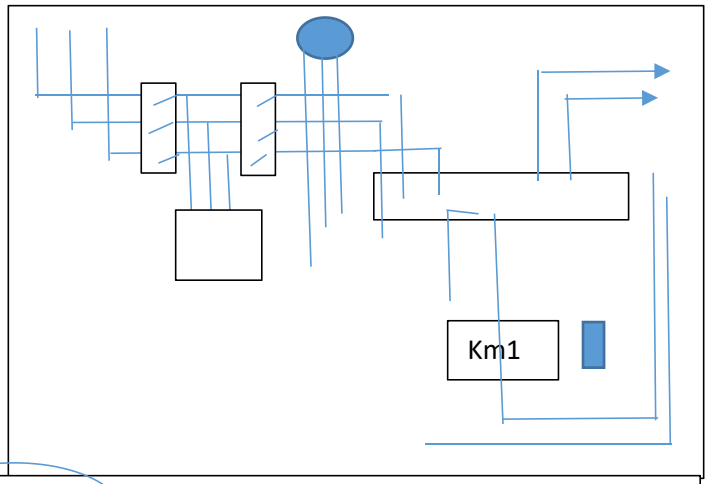


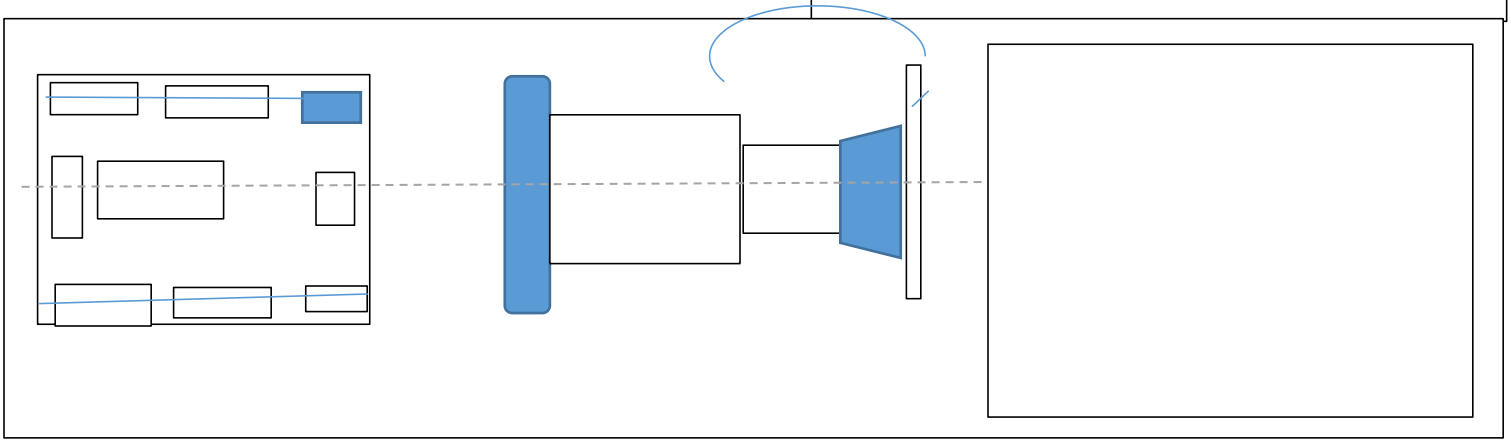


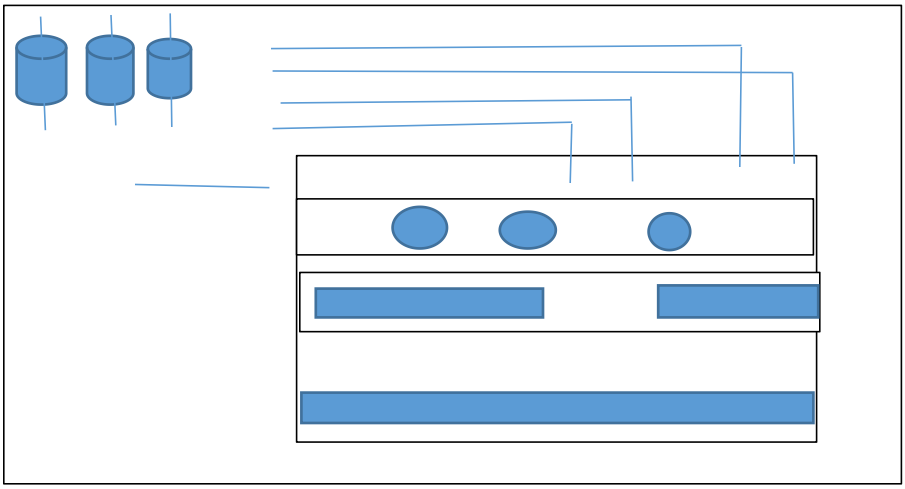


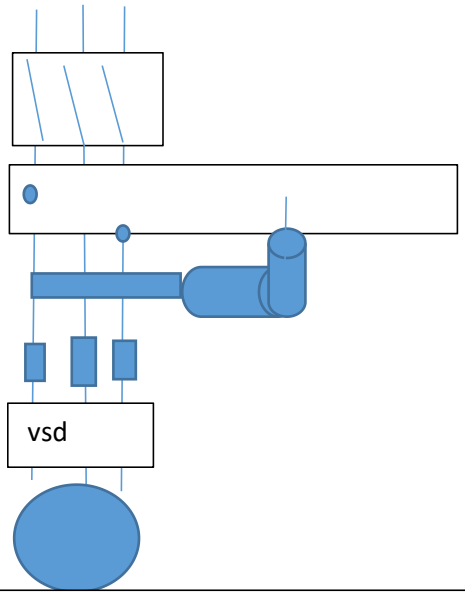


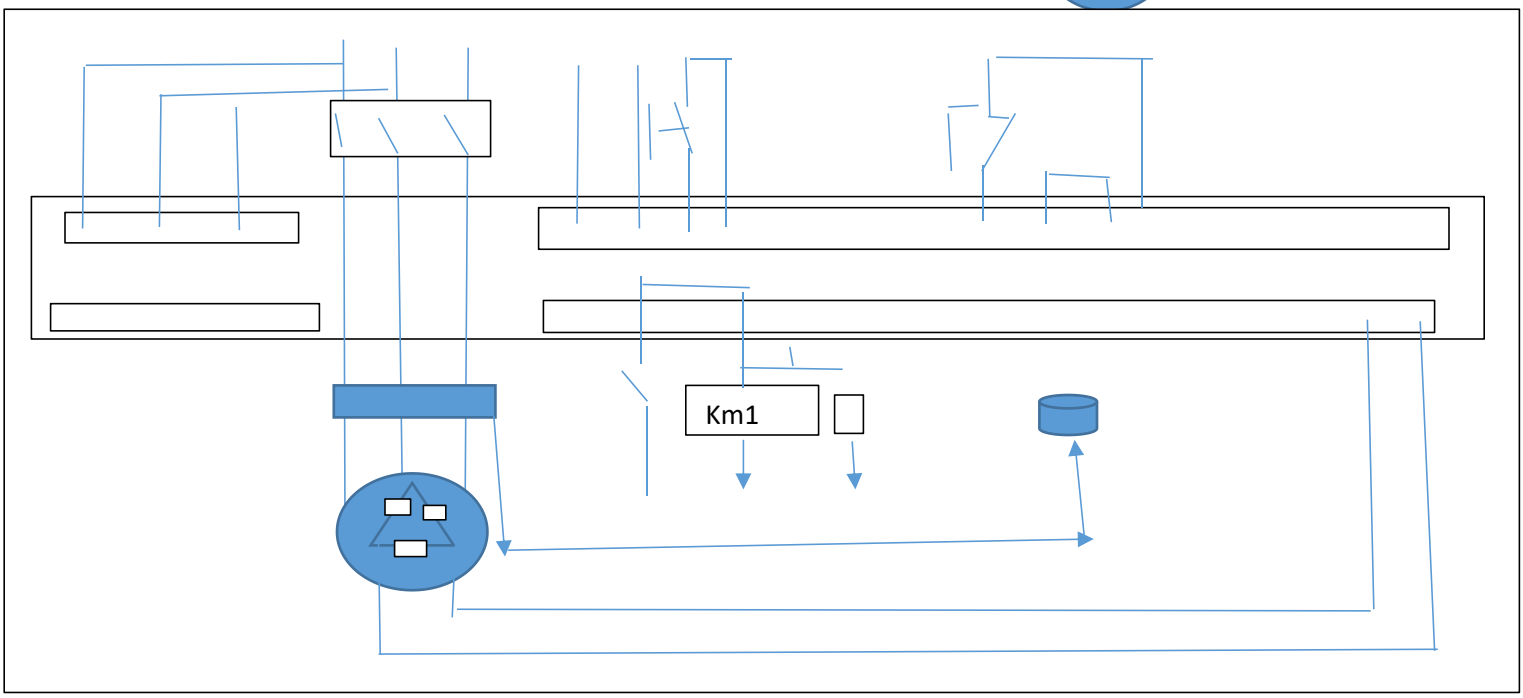


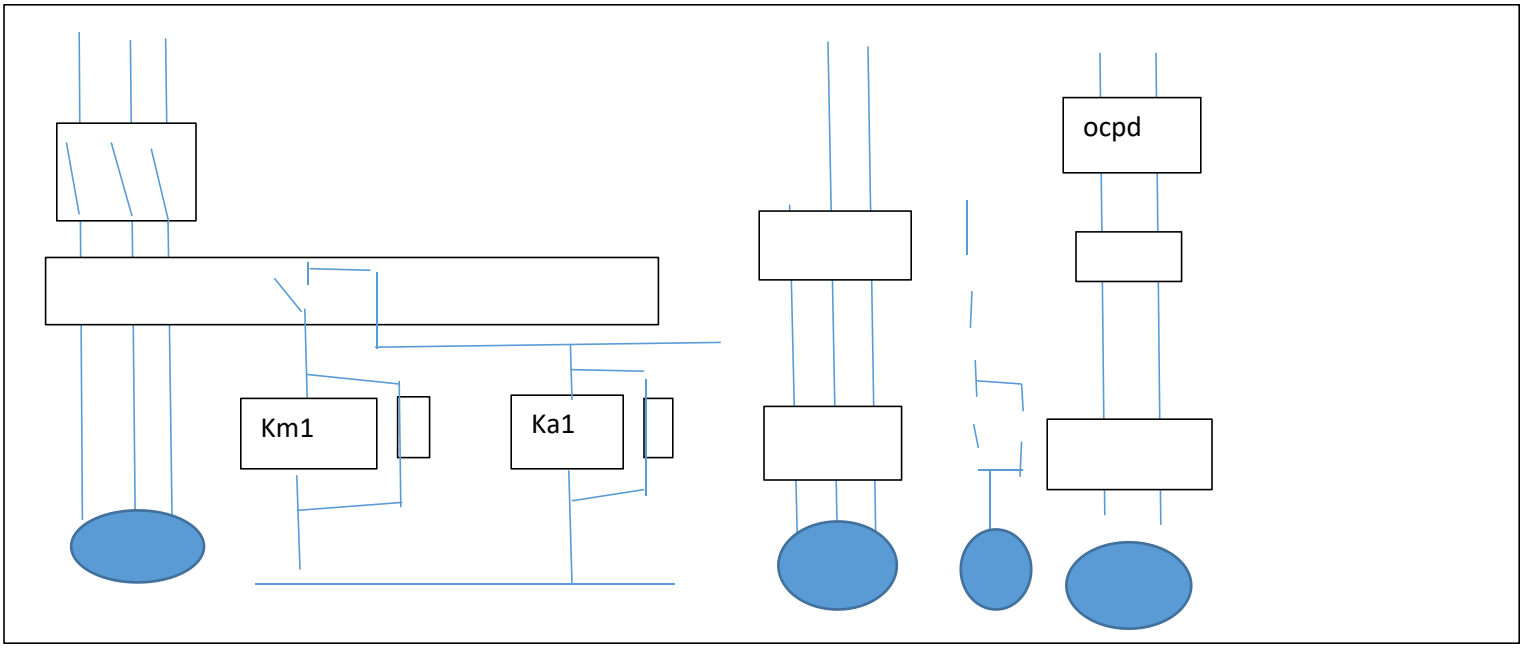

Km1

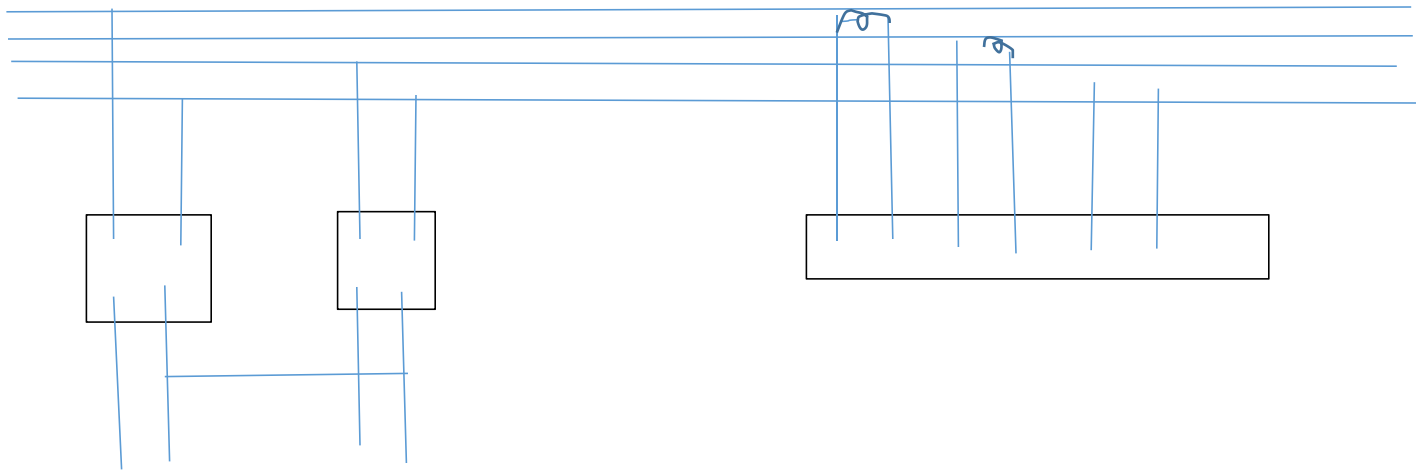





vsd


Km1


Km1
Ka1
ocpd



Tesys tltmr, motor management controller , installation guide , d0ca, hazard categorie , introduction motor, installation , commission , maintenance , configuration parameter ,wiring diagrame,,,,

1 .clearence zone , danger, warning , dimension mm/in ,,assembly, mounting , mount plate,operation control, wiring current ,wiring diagrame,ltm , output interpositing relay

Power xld dg1/dh1, seie

framesize Ct kw cthp vthp cto catalog

Description Catlog number 480v 600 number

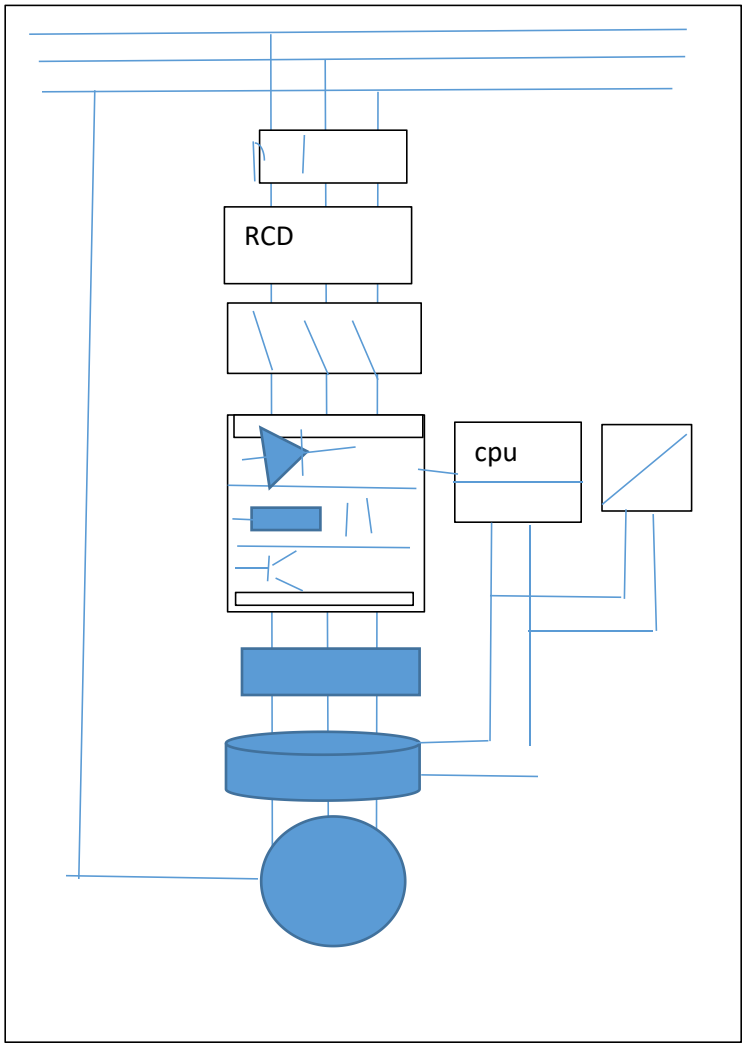
Man fan kit

Control fan

Bus igbrt module

Outer house

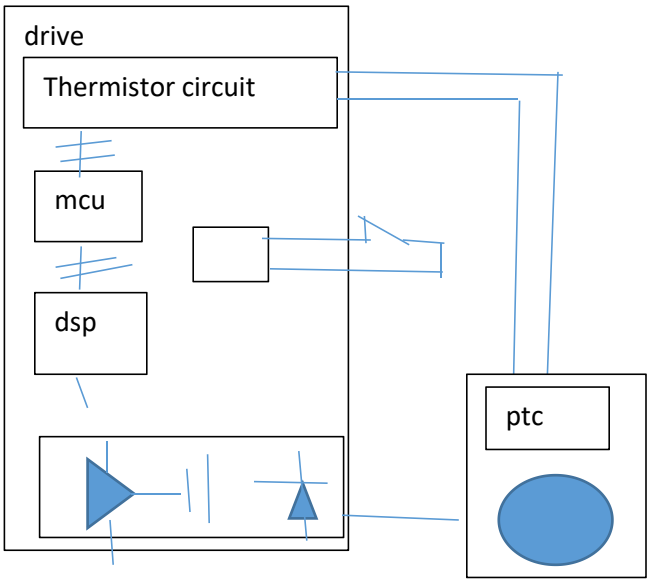
Type 12

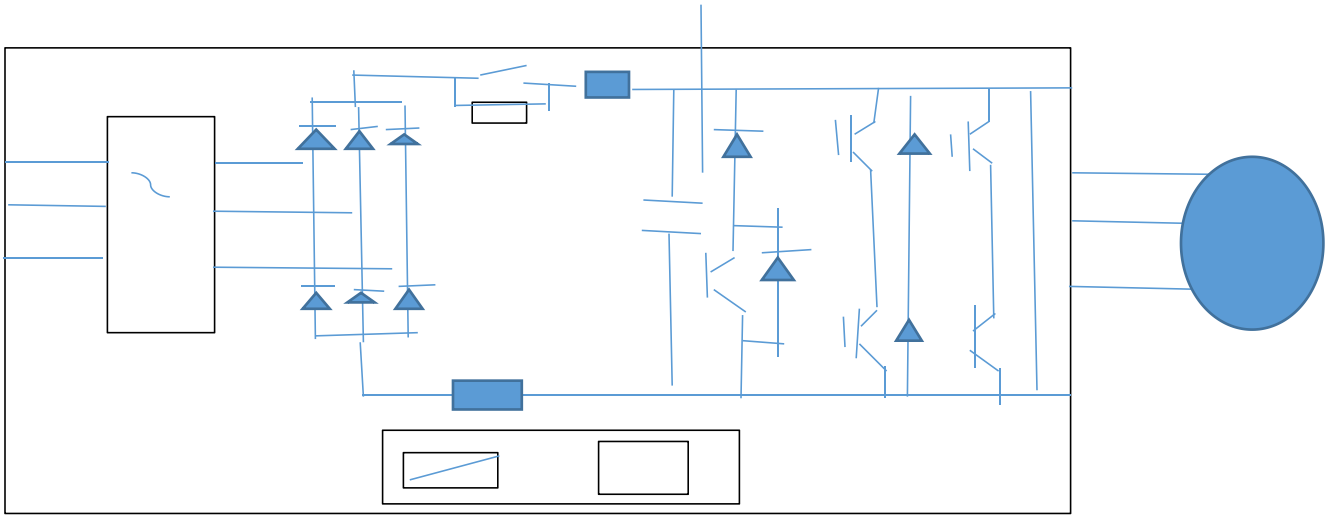


Ister , motor and application, motor and application , item ,

Power grid , configuration input output voltage , breakers , fuse , cable, cross. Section .

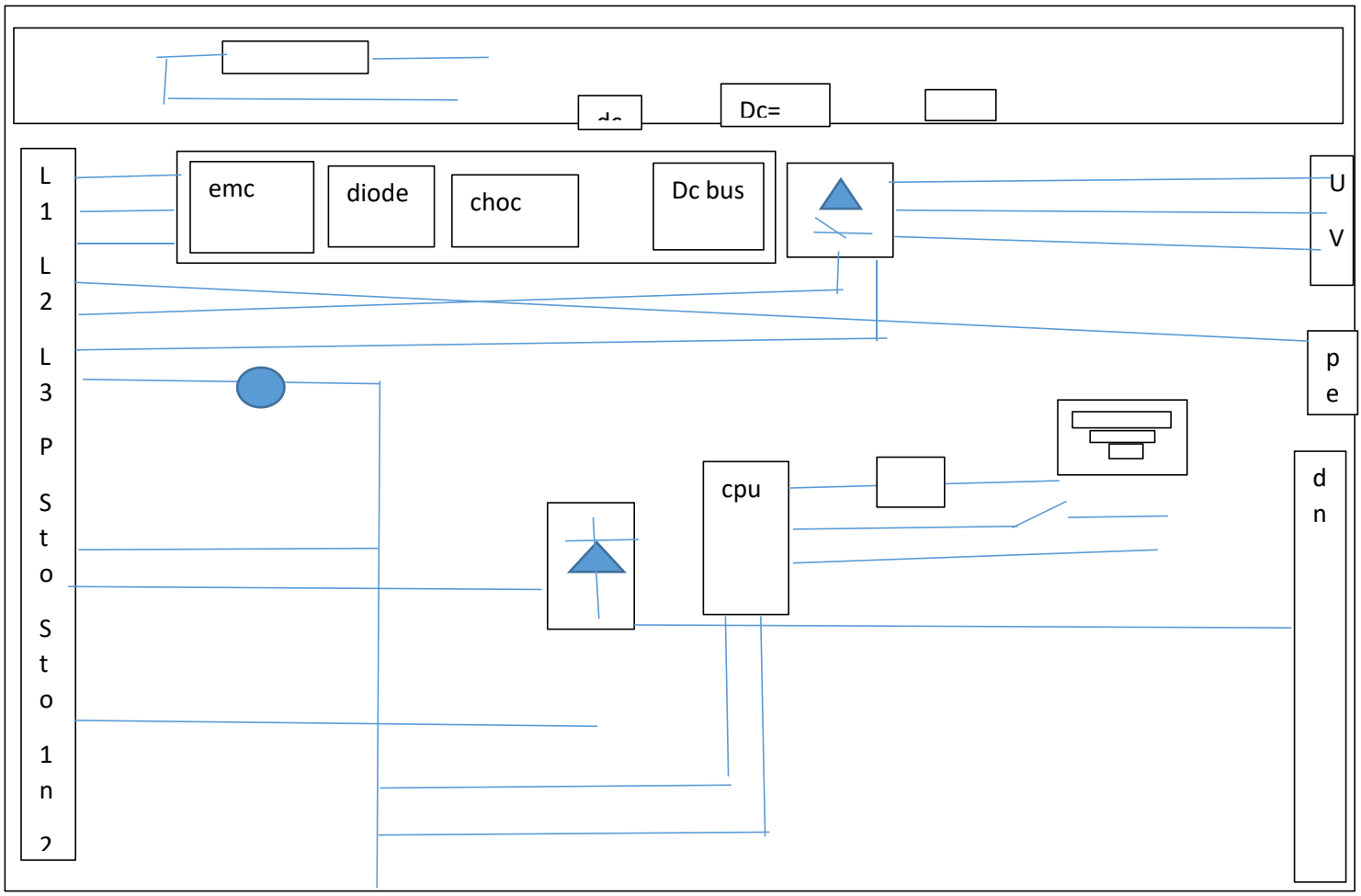
- Protection person, and animals, input disconector frequence disconnect , inverter mounting , output reactor, dv/dt filter , motor protector, m

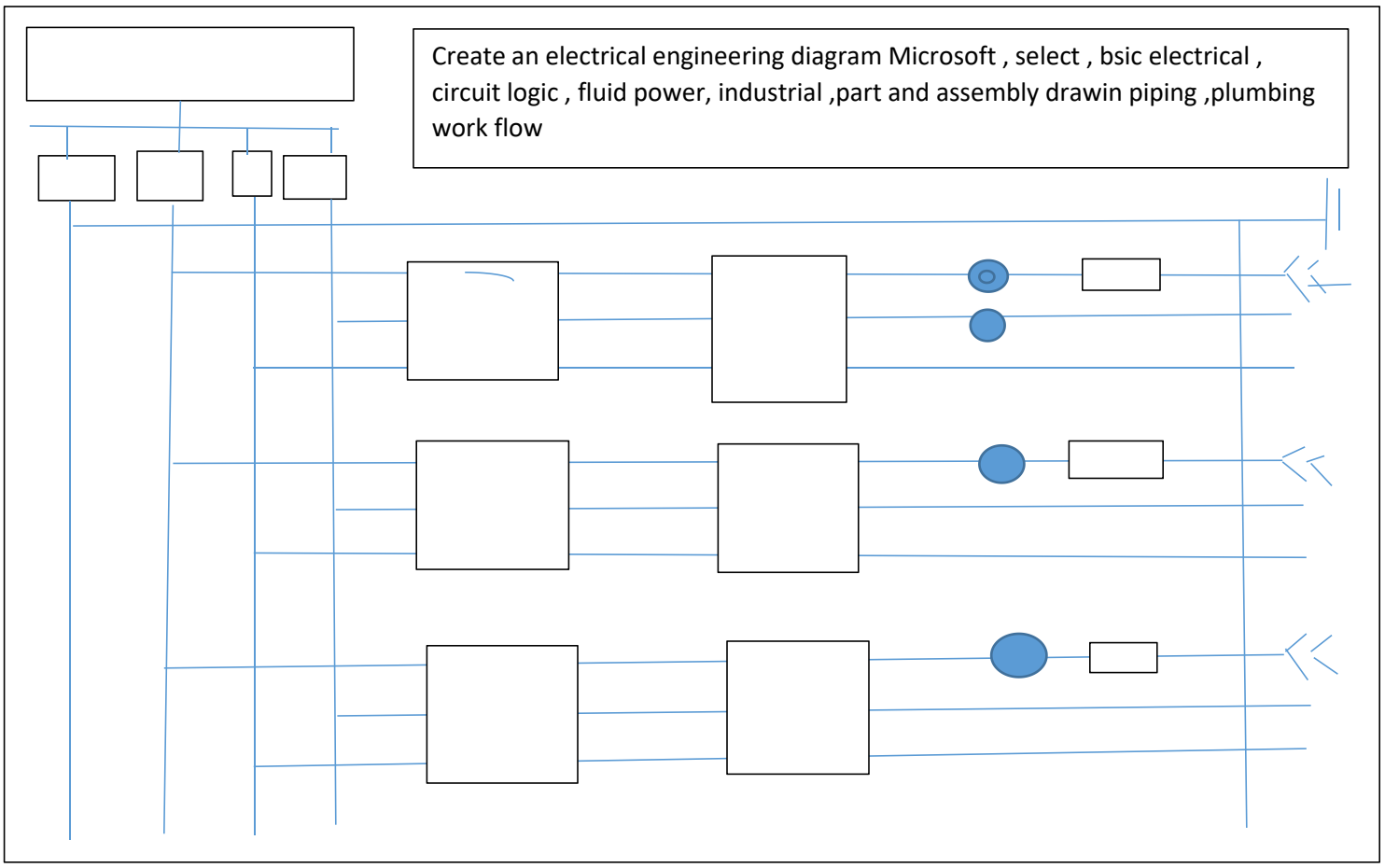


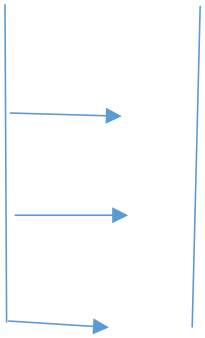


Electrical power network , input configuration , energy supplier deviation rated value, deviation phase balance max 3%,

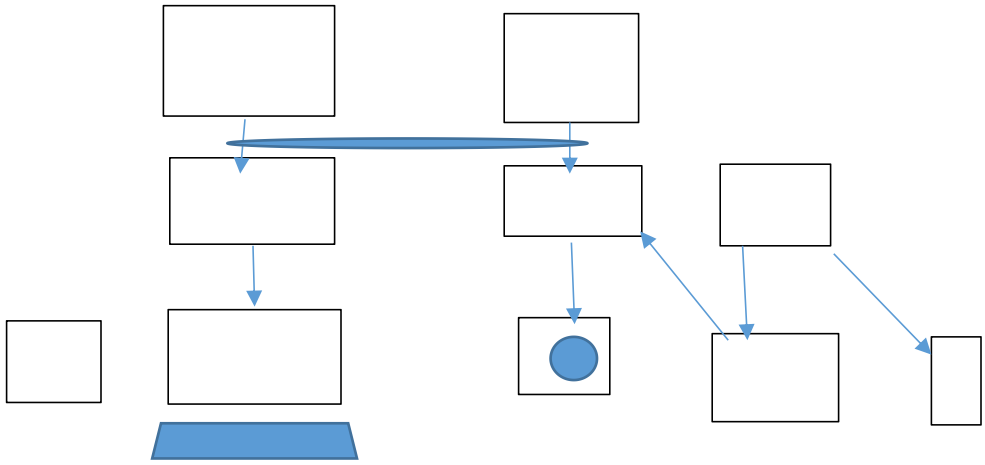
Description ,1 supplies l,l2,l3 input voltage iln , internal frequency , smps switch resistor , inverter dc /ac , motor , key pad button , 3ph asynchrony variable speed , dc


Dc=
L1
L2
L3
P
Sto
Sto
1n
emc
diode
choc
Dc bus
U
V
pe
cpu
dn

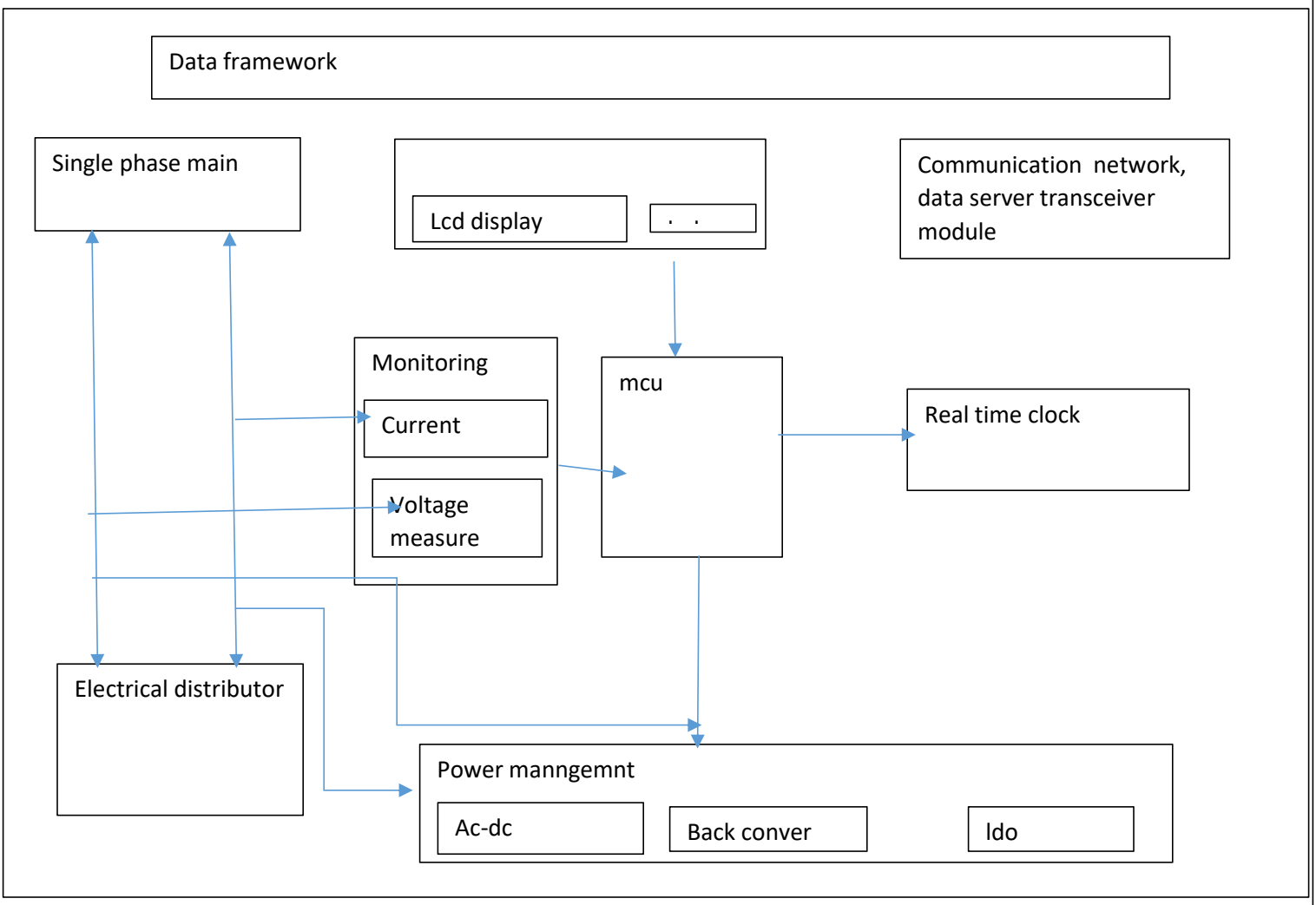

Create an electrical engineering diagram Microsoft , select , bsic electrical , circuit logic , fluid power, industrial ,part and assembly drawin piping ,plumbing work flow

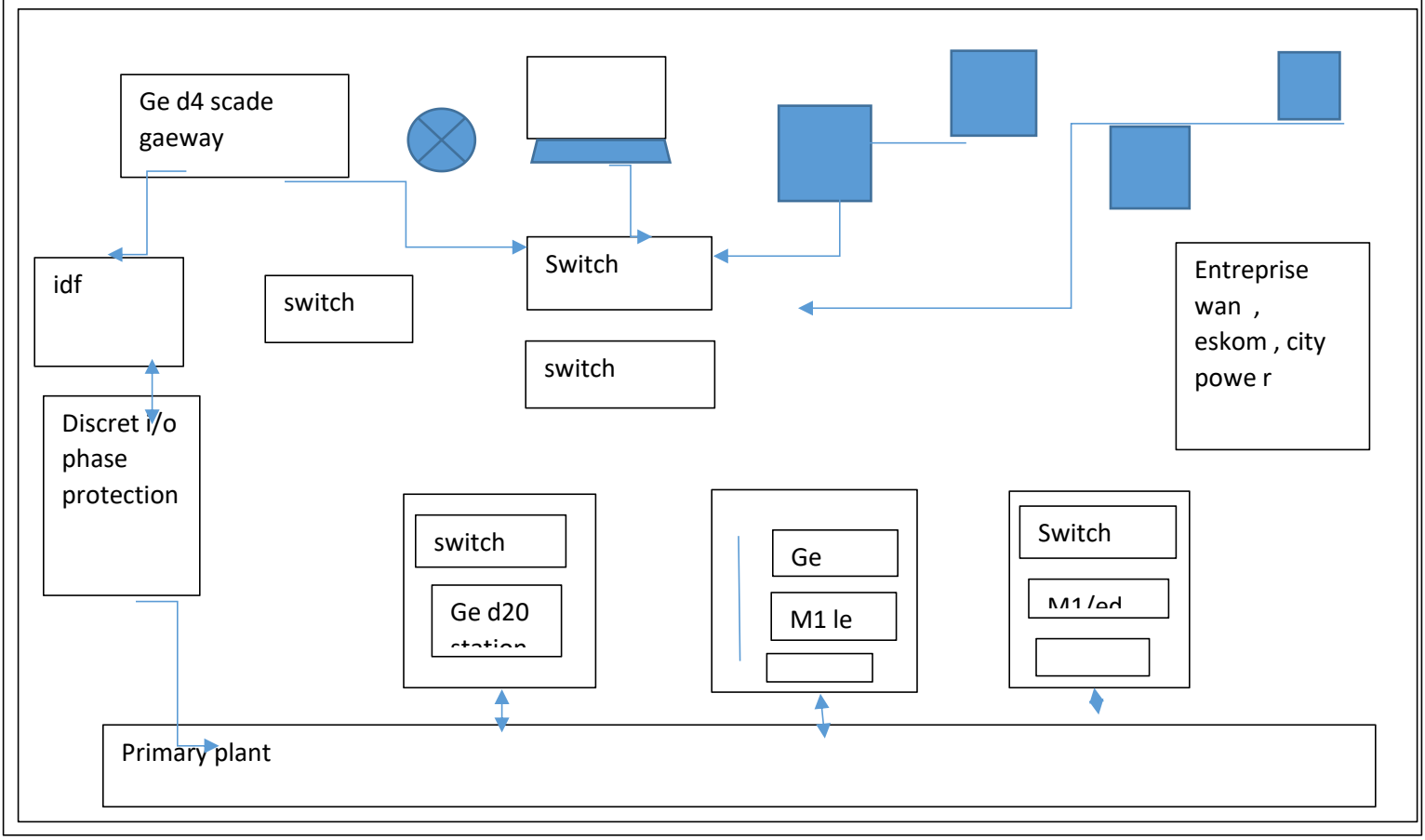


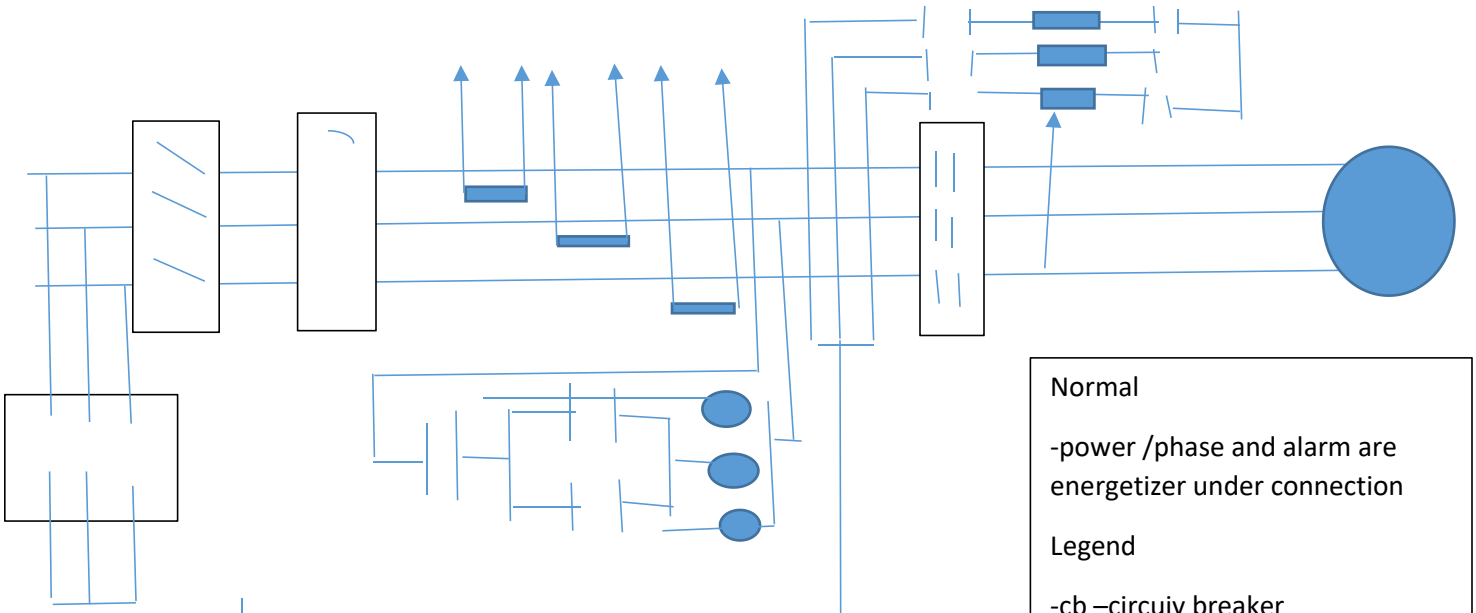
Azure, windows online machine



Sisco, cataliser ,, 4x 25 uplink spread 48 part switch , to gbp +36


Data framework
Single phase main
Lcd display
Communication network, data server transceiver module
Monitoring
Current
Voltage measure
mcu
Real time clock
Electrical distributor
Power manngemnt
Ac-dc
Back conver
ldo


Ge d4 scade gaeway
idf
switch
Switch
switch
Entreprise wan , eskom , city powe r
Discret I/o phase protection
switch
Ge d20
Ge
M1 le
Switch
Primary plant



Normal

-power /phase and alarm are energetizer under connection

Legend

-cb –circuiy breaker

Ct current transformer

Mis main isolating switch

Msh manual start micro

R –run contactor

S starting contactor

Y ,wy ,,

Revision ,date drawing note

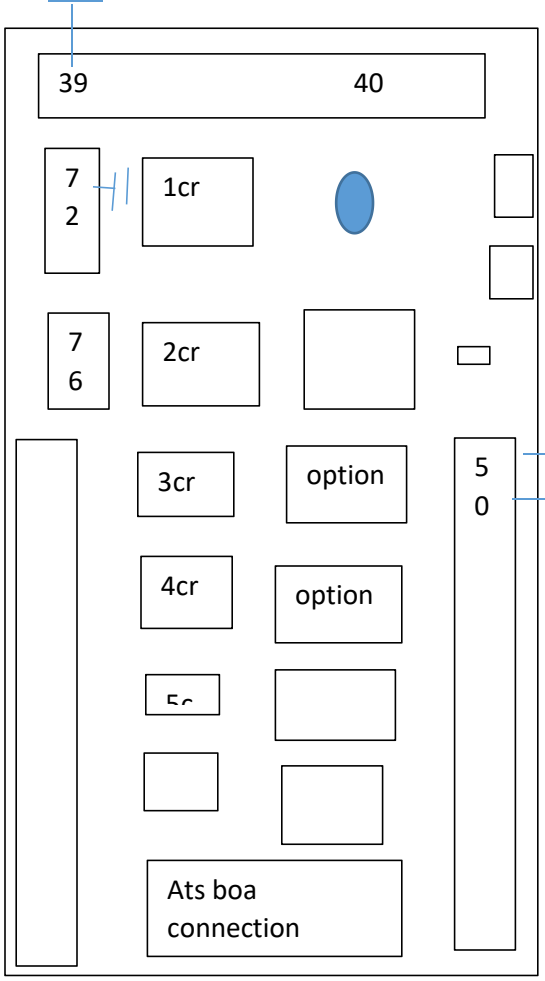
Start up

accelerat

common

Power

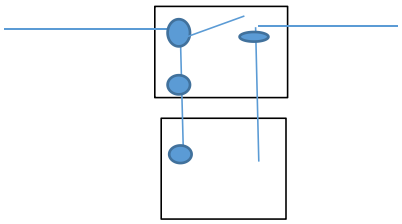
phase



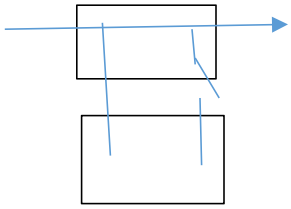
Disla
y ,
norm
al

Bpm connection switch position

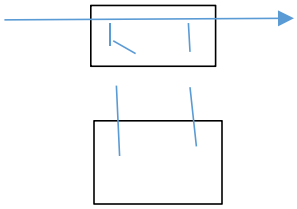
ups

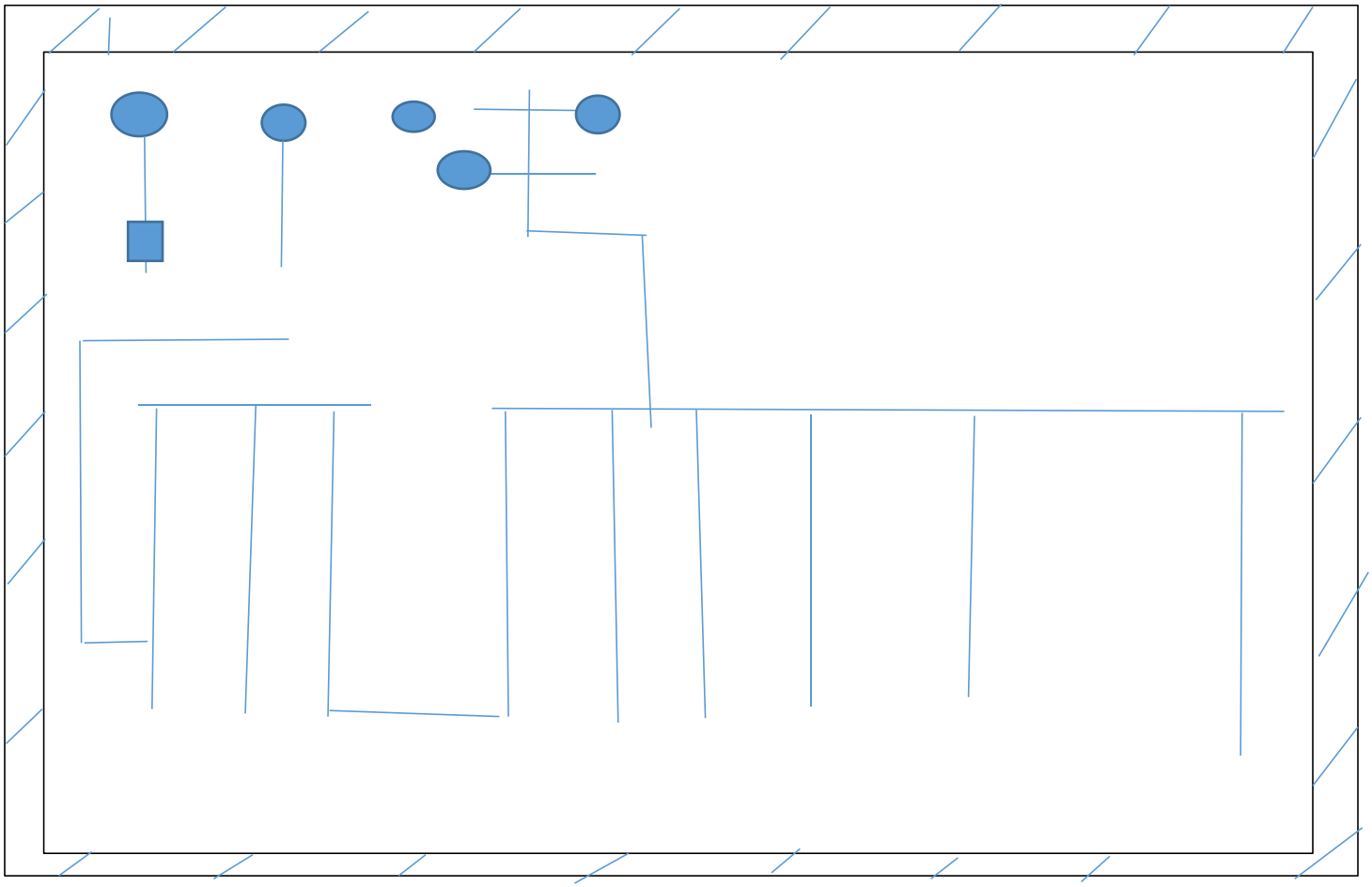


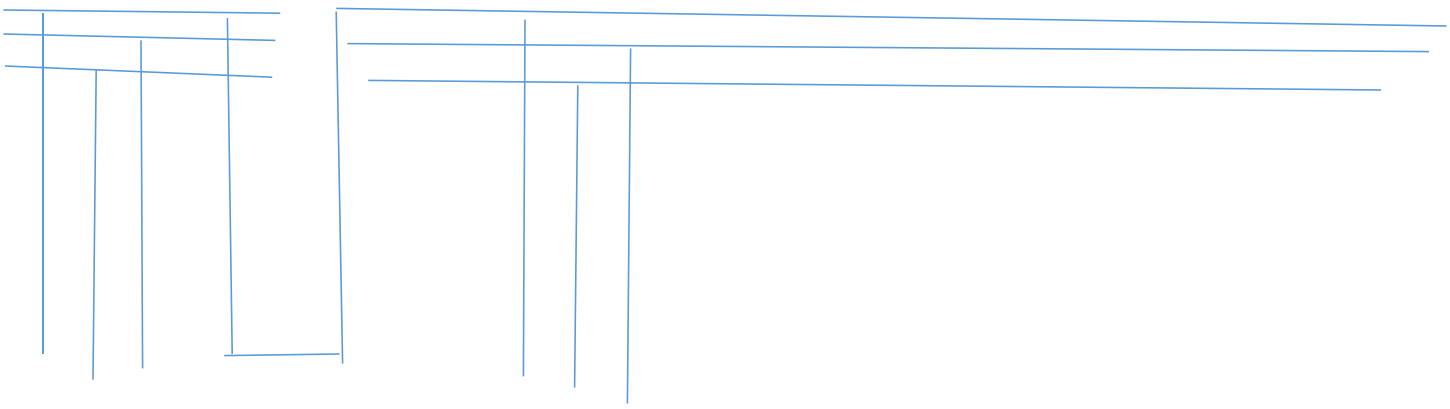
Line

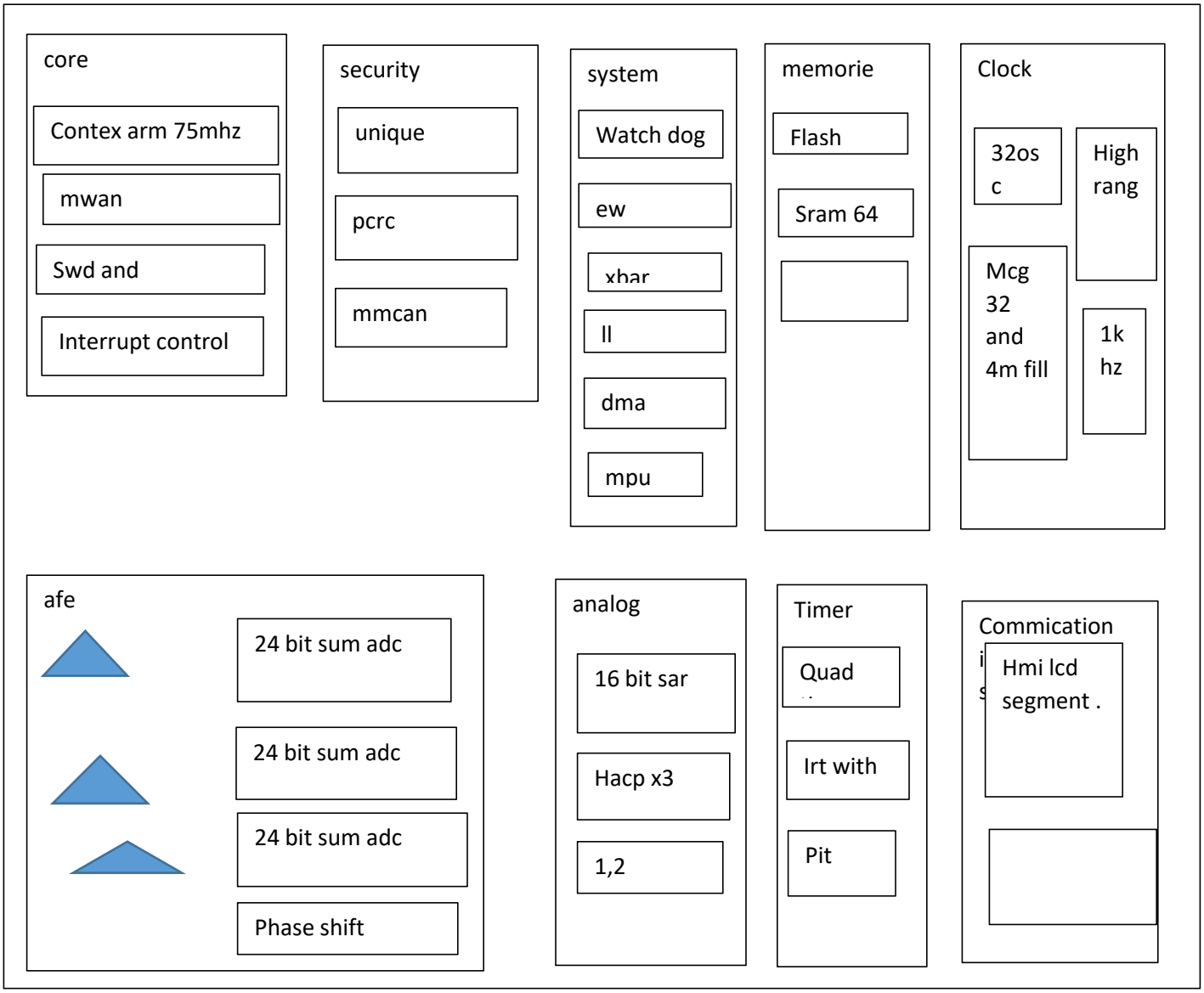


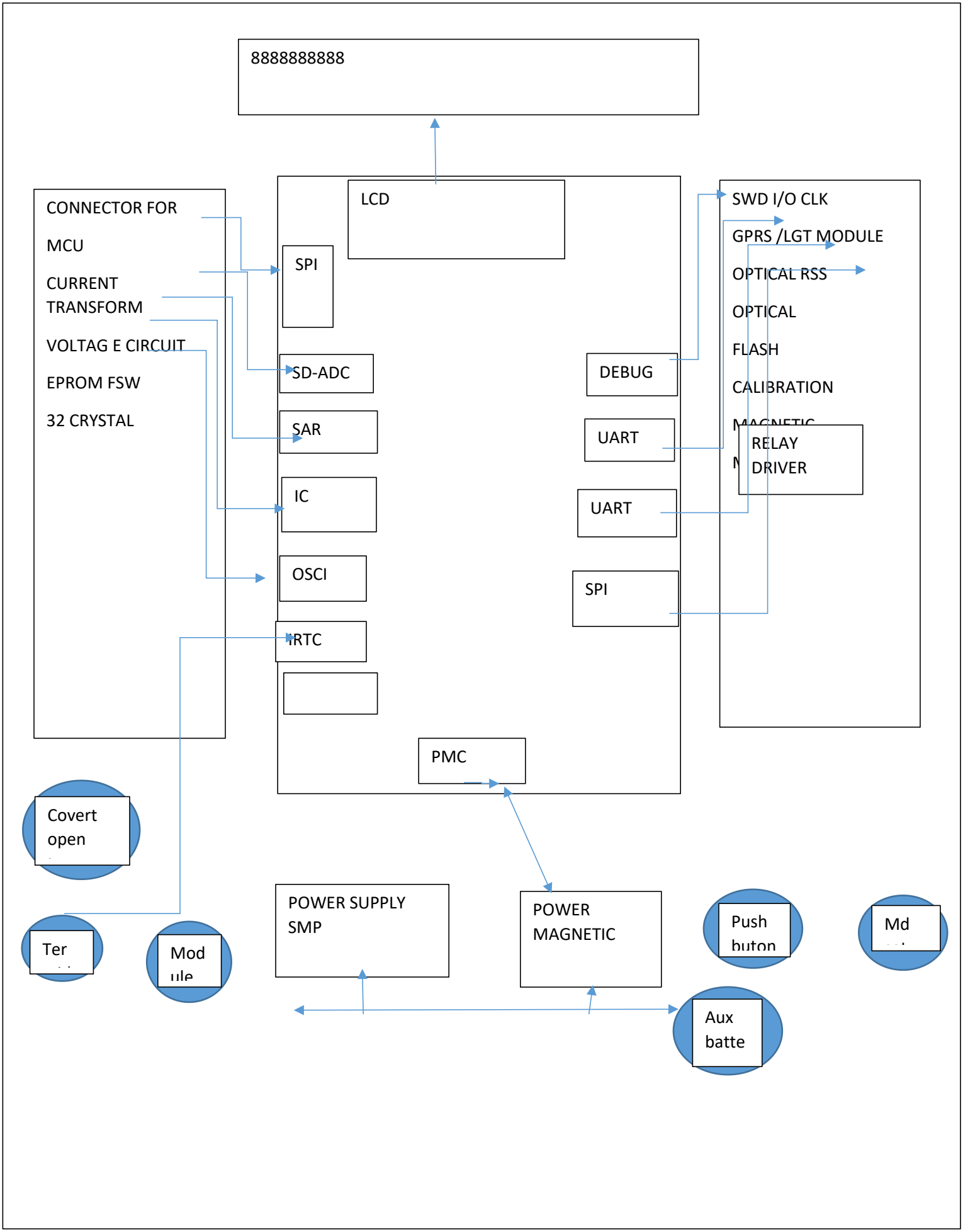
Service

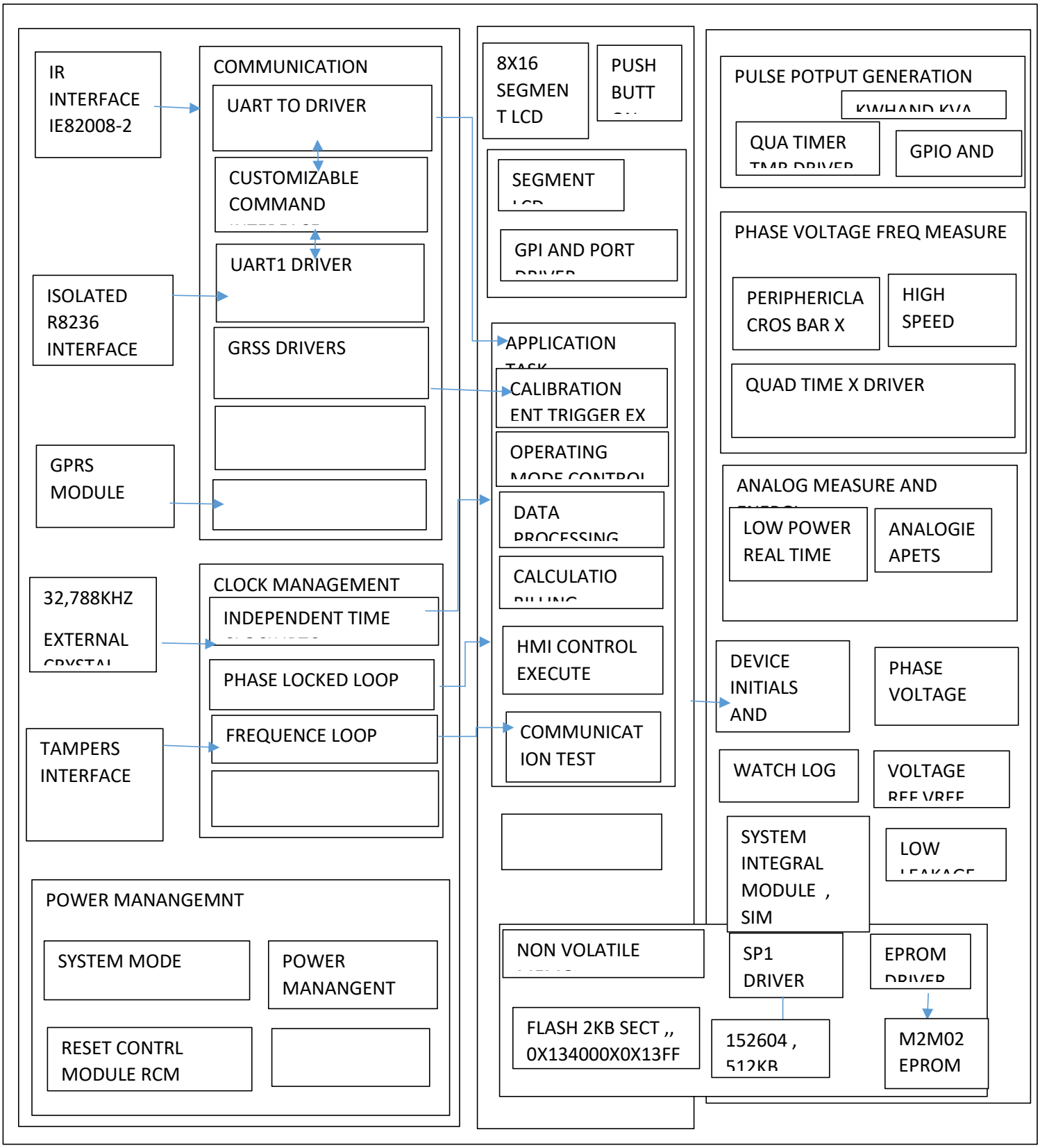


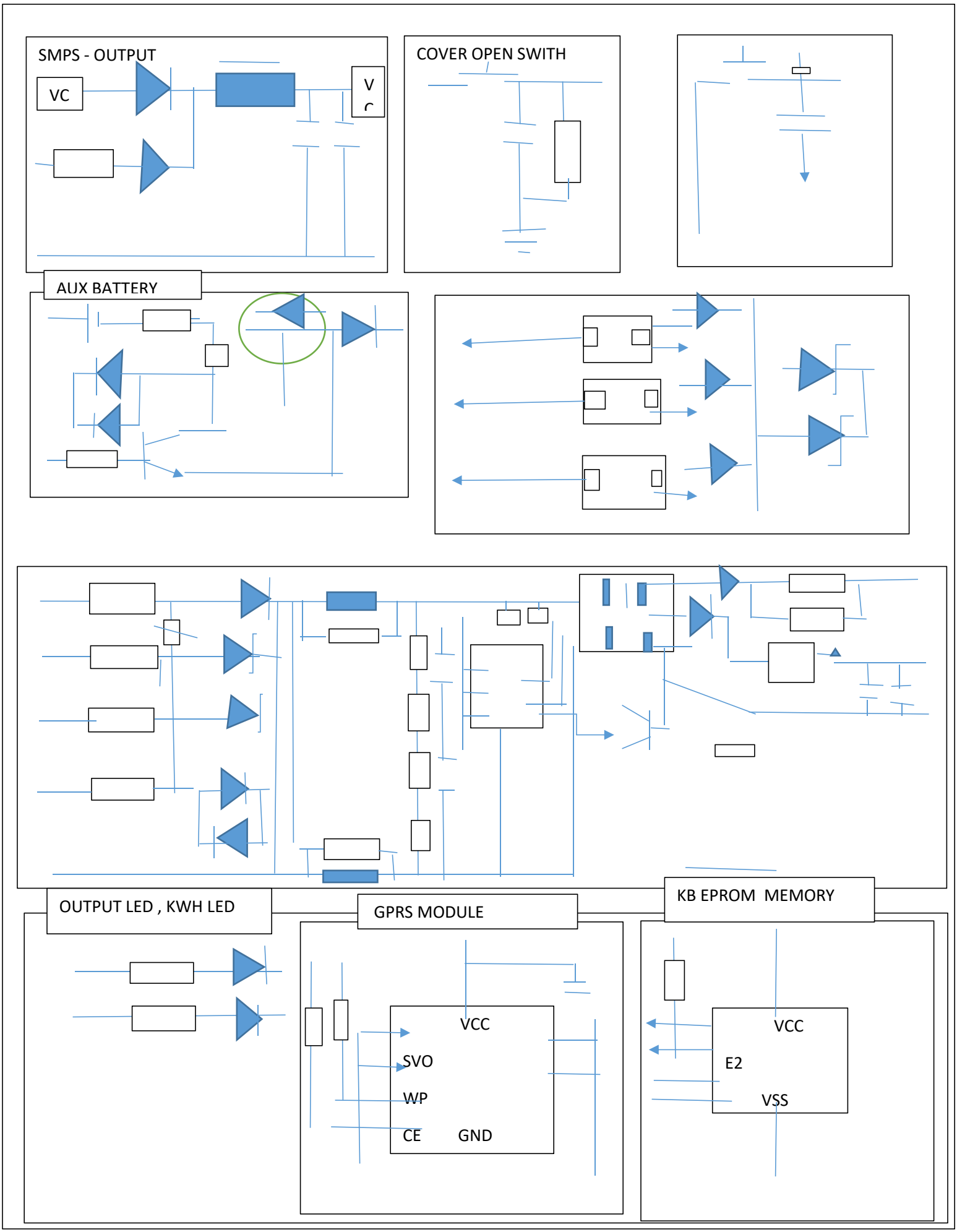


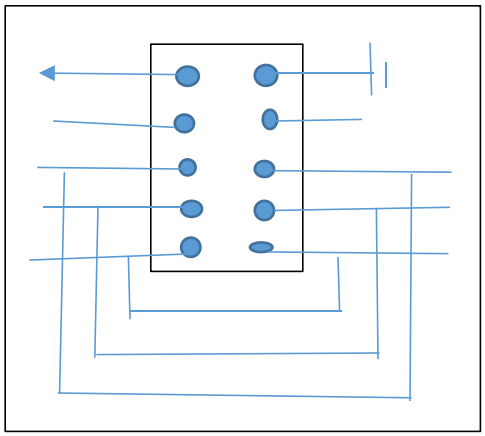



core
Contex arm 75mhz
mwan
Swd and
Interrupt control
security
unique
pcrc
mmcan
system
Watch dog
ew
xbar
ll
dma
mpu
memorie
Flash
Sram 64
Clock
32os c
High rang
Mcg 32 and 4m fill
1k hz
afe
24 bit sum adc
24 bit sum adc
24 bit sum adc
Phase shift
analog
16 bit sar
Hacp x3
1,2
Timer
Quad
Irt with
Pit
Commication
Hmi lcd segment .

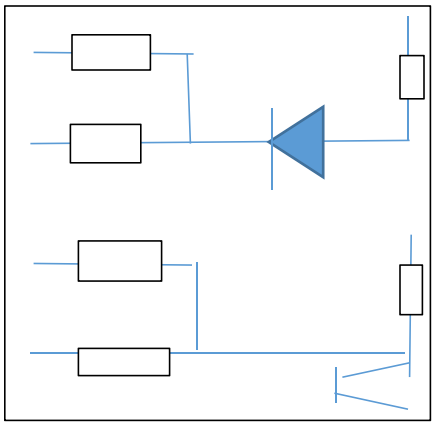

8888888888
LCD
CONNECTOR FOR
MCU
CURRENT
TRANSFORM
VOLTAG E CIRCUIT
EPROM FSW
32 CRYSTAL
SPI
SD-ADC
SAR
IC
OSCI
RTC
DEBUG
UART
UART
SPI
PMC
SWD I/O CLK
GPRS /LGT MODULE
OPTICAL RSS
OPTICAL
FLASH
CALIBRATION
RELAY
DRIVER
Covert
open
Ter
Mod
ule
POWER SUPPLY
SMP
POWER
MAGNETIC
Push
buton
Md
Aux
batte


IR INTERFACE IE82008-2
COMMUNICATION
UART TO DRIVER
CUSTOMIZABLE COMMAND
UART1 DRIVER
ISOLATED R8236 INTERFACE
GRSS DRIVERS
GPRS MODULE
CLOCK MANAGEMENT
32,788KHZ
EXTERNAL
INDEPENDENT TIME
PHASE LOCKED LOOP
FREQUENCE LOOP
TAMPERS INTERFACE
POWER MANANGEMNT
SYSTEM MODE
POWER MANANGENT
RESET CONTRL MODULE RCM
8X16 SEGMEN T LCD
PUSH BUTT
SEGMENT
GPI AND PORT
APPLICATION
CALIBRATION ENT TRIGGER EX
OPERATING
DATA
CALCULATIO
HMI CONTROL EXECUTE
COMMUNICAT ION TEST
PULSE POTPUT GENERATION
QUA TIMER
GPIO AND
PHASE VOLTAGE FREQ MEASURE
PERIPHERICLA CROS BAR X
HIGH SPEED
QUAD TIME X DRIVER
ANALOG MEASURE AND
LOW POWER REAL TIME
ANALOGIE APETS
DEVICE INITIALS AND
PHASE VOLTAGE
WATCH LOG
VOLTAGE
SYSTEM INTEGRAL MODULE , SIM
LOW
NON VOLATILE
SP1 DRIVER
EPROM
FLASH 2KB SECT ,, 0X134000X0X13FF
152604 ,
M2M02 EPROM

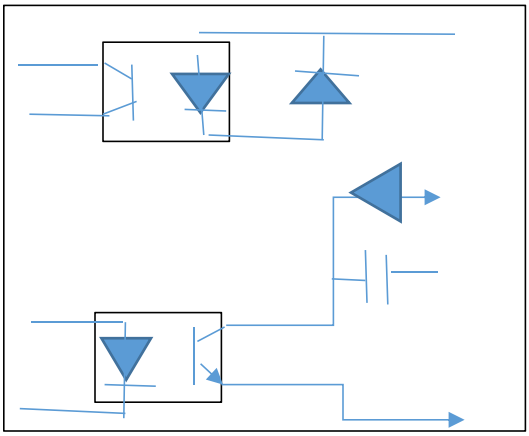

SMPS - OUTPUT
VC
V
C
COVER OPEN SWITH
AUX BATTERY
OUTPUT LED , KWH LED
GPRS MODULE
VCC
SVO
WP
CE
GND
KB EPROM MEMORY
VCC
E2
VSS

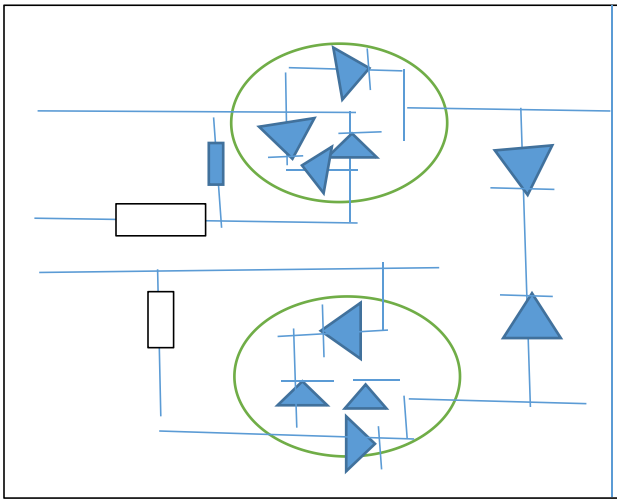


GPRSS MODULE

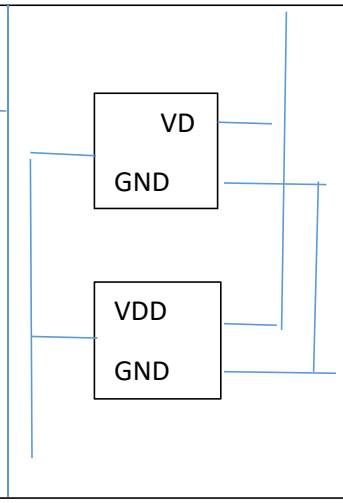


IR CONTROL

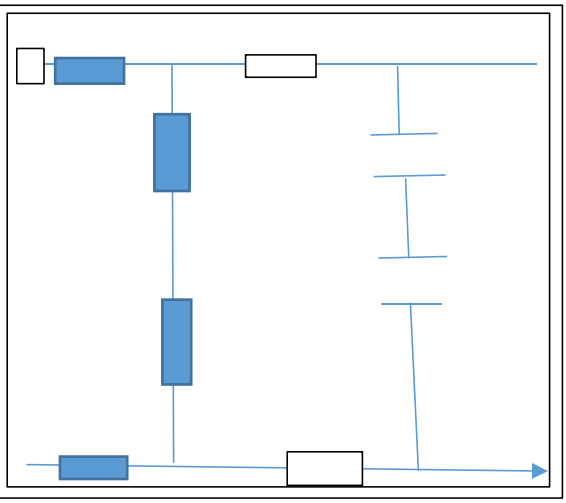




RELAY CONTROL



MAGNETIC TAMPE



PHASE CURRENT CONDITION

BASE THREE PHASE SMART POWER :

-CONTENT

INTRODUCTION

SERIES MKM35512 SERIES

BASIC THEORY

HARDWARE DESIGN

SOFTWAE DESIGN

APPLICATION SETUP

CCURACY AND PERFORMANCE

METERING BOARD ELECTRONIC

MEERING BOARD LAYOUT

BILL OF MATERIALS OF THE METERING

BILL OF MATERIAL OF THE GPRS ,

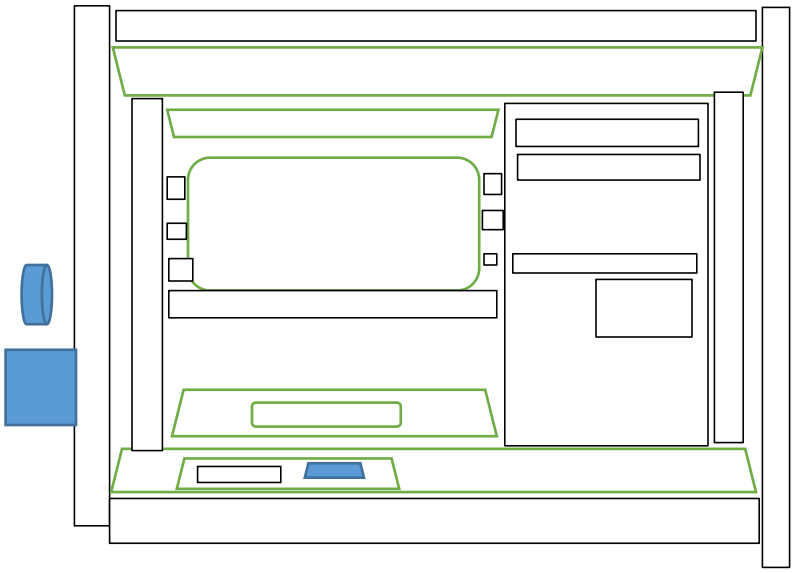
BASIC THEORY

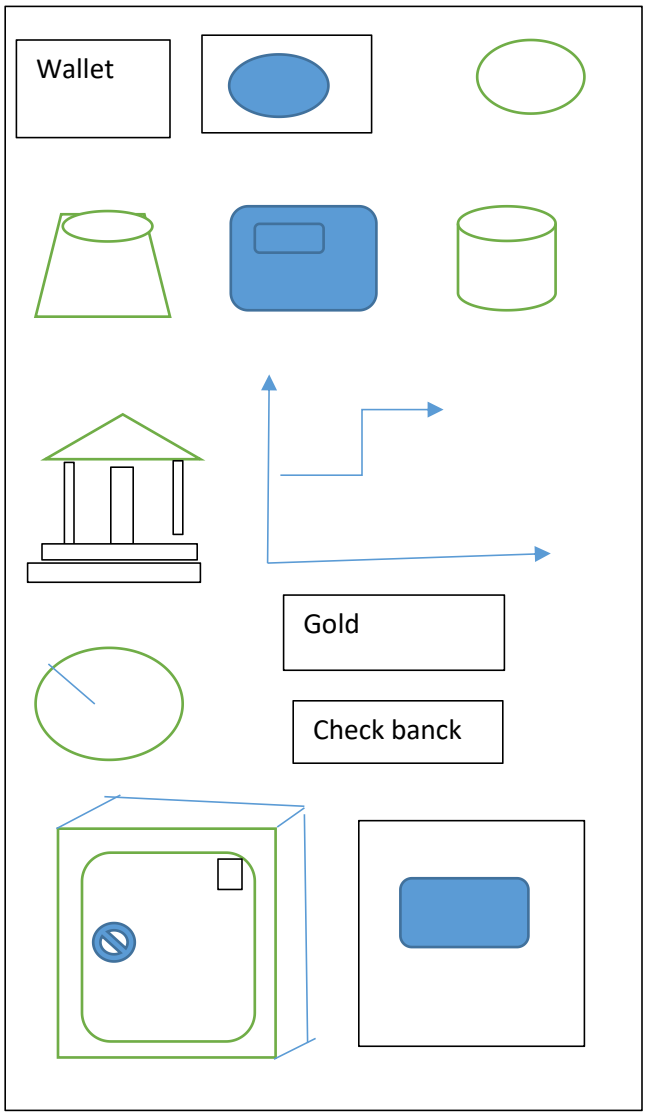
- ACTIVE ENERGY , WH$\int_0^\infty U(t)i.(t)dt$
- Reactive energy varh =$\int_0^\infty u(t-90°)i(t)(dt)$
- Active power ,, P=1/T$\int_0^\infty u(t).i(t)dt$
- Reactive power :Q=1/t$\int_0^\infty u(t-90°°)i(t)dt$
- Irm=$\sqrt{1}/T[i(t)],\quad ^2$.dt
  urm=$\sqrt{1}/T\int_o^t[u(u(t)]\quad ^2$.dt
  S=IRMSXURMS,,,S=$\sqrt{P^2}+Q^2$

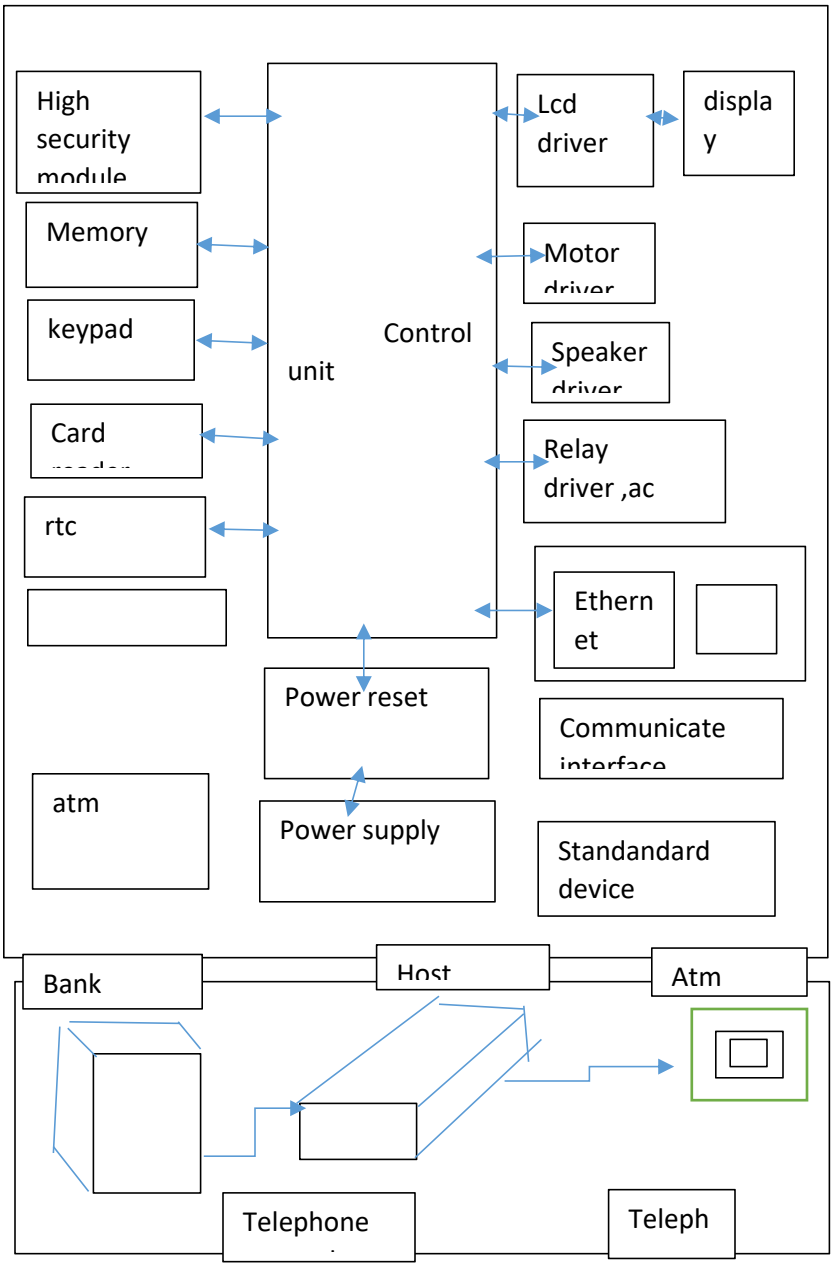
  HARDWARE DESIGN , POWER SUPPLY, DIGITAL CIRCUIT , ANANLOGICAL SIGNAL CONDITION

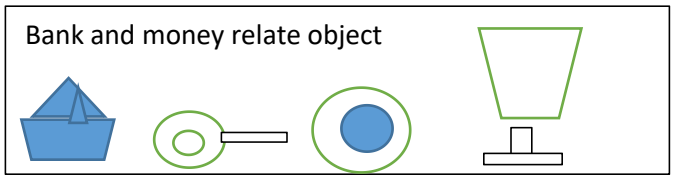
TYPE OF METER……..	THREE PHASE AC STATIC WATT HOUR SMART
1. TYPE OF MEASUREMENT	Four quadran
2. METERING ALGORITH	-low power real time based (
3. ACCRACY	-1514697 class,0,5(0,5%)
4. NOMIL VOLTAGE	-240 vac +20%
5. CURRENT RANGE	-0-60a(10 a is nominal current , dynamic range is up to 72a
6. NOMINAL FREQUENCE	-50hz+5%
7. METER CONST (IMP/KWH,M /K KVARH	1600
8. FUNCTINALITY	V,a,kw,nar,va,kwh.import export kvah , import,export voltage
9. VOLTAGE SENSOR	Current transformer ct with 25000/1tr
10. CURRENT SENSORS	Two red led active and reactive energy , 8x15 segment lcd on ,
11. ENERGY OUTPUT PULSE	Two hidden button module area and
12. ENERGY OUTPUT PULSE INTERFACE	9600/8-n1-1 ir interface
13. USE INTERFACE HM	Gprs module 1x sim card sbt ip6
14. TAMPER DETECTION	Capable module
15. IEC 62056 INFARED INTERFACE	M24m2 , 256 kb
16. REMOTE COMMUNICATION	Is lq040b
17. EXTERVMS EPROM	12,a,,36 v ,
18. NAL NVA	11 ma
19. FLASH	2ma
20. INTERNAL BATTERY	12 ua
21. POWER CONSUMOTION @3.3and 22 degree	
22. Normal mode power from main	
23. Standby mode power from	
24. Power –down power	

Financdement hand down





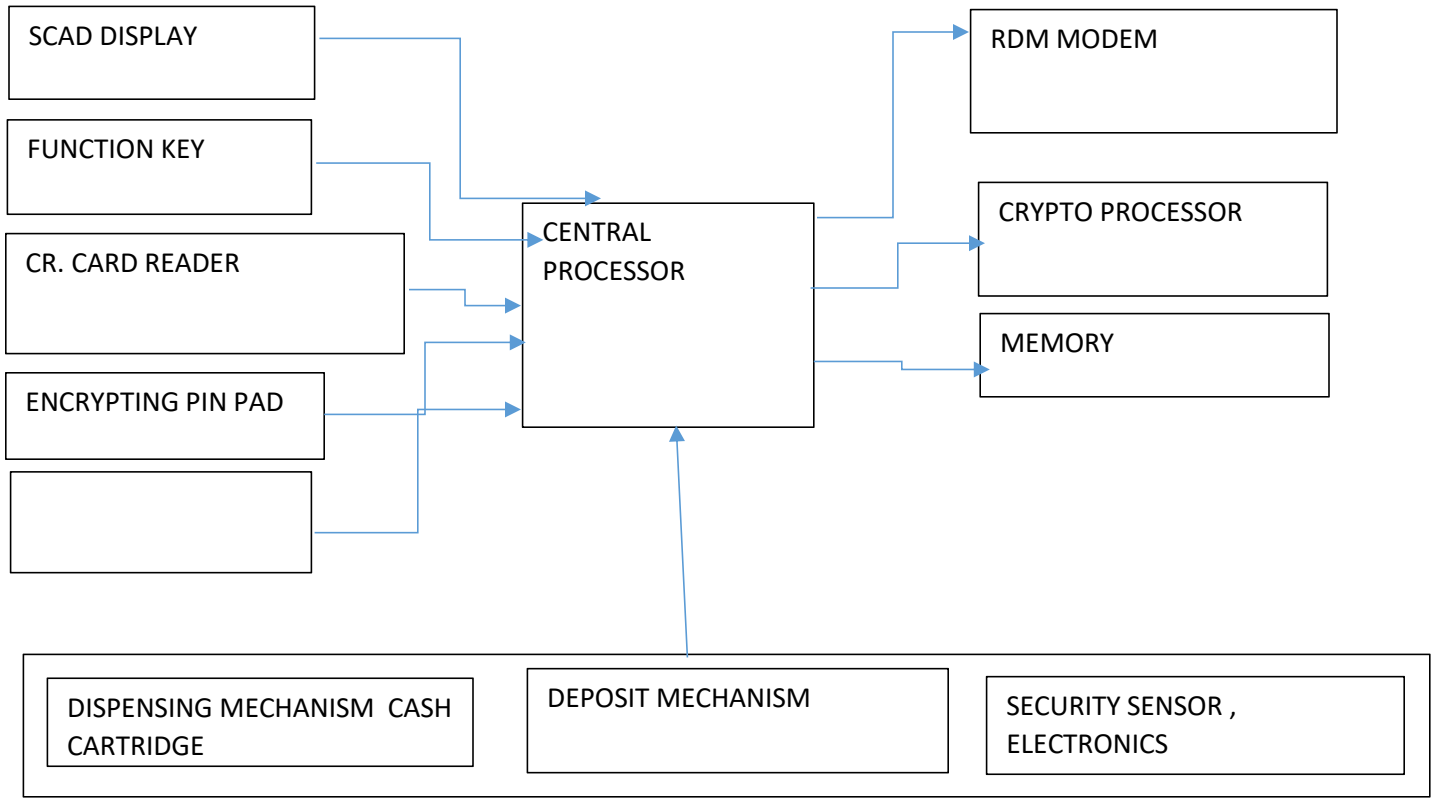




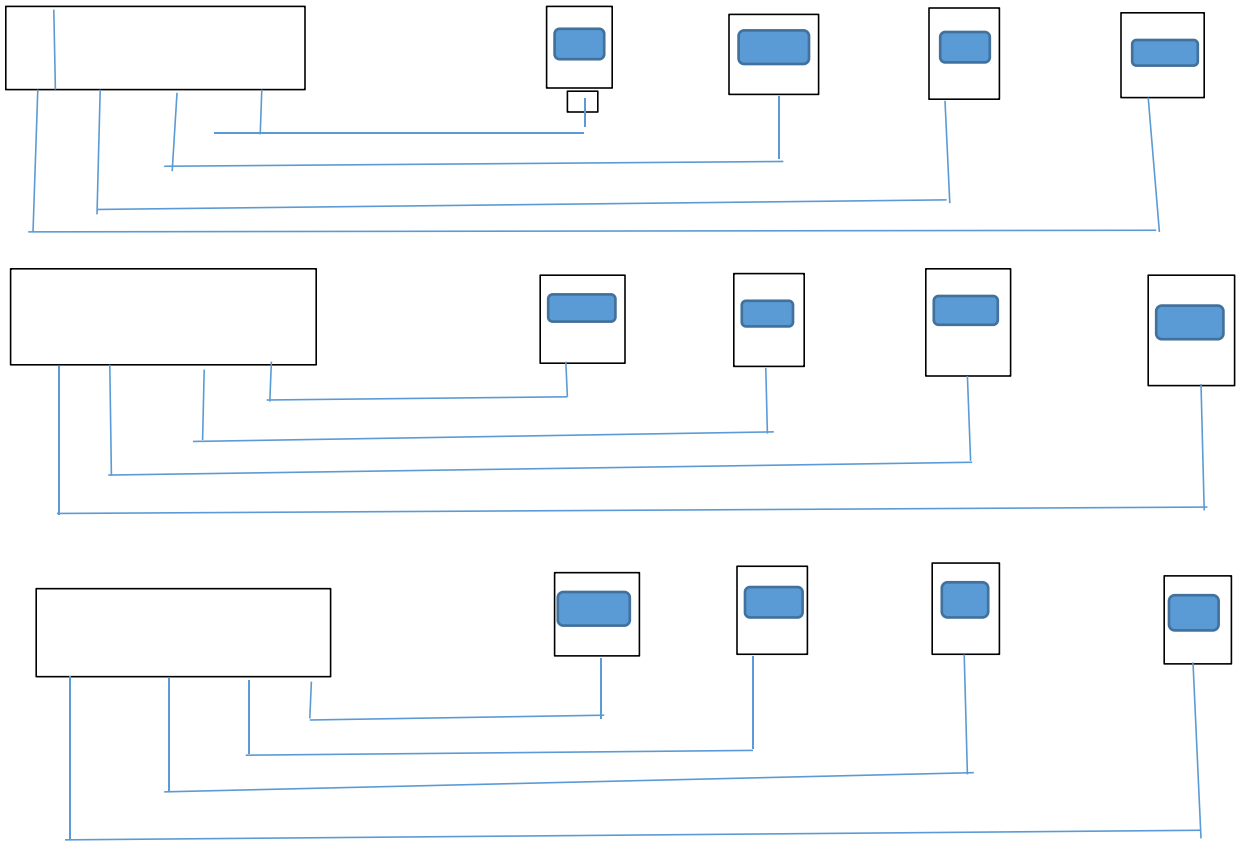
Patent Priority days Publication

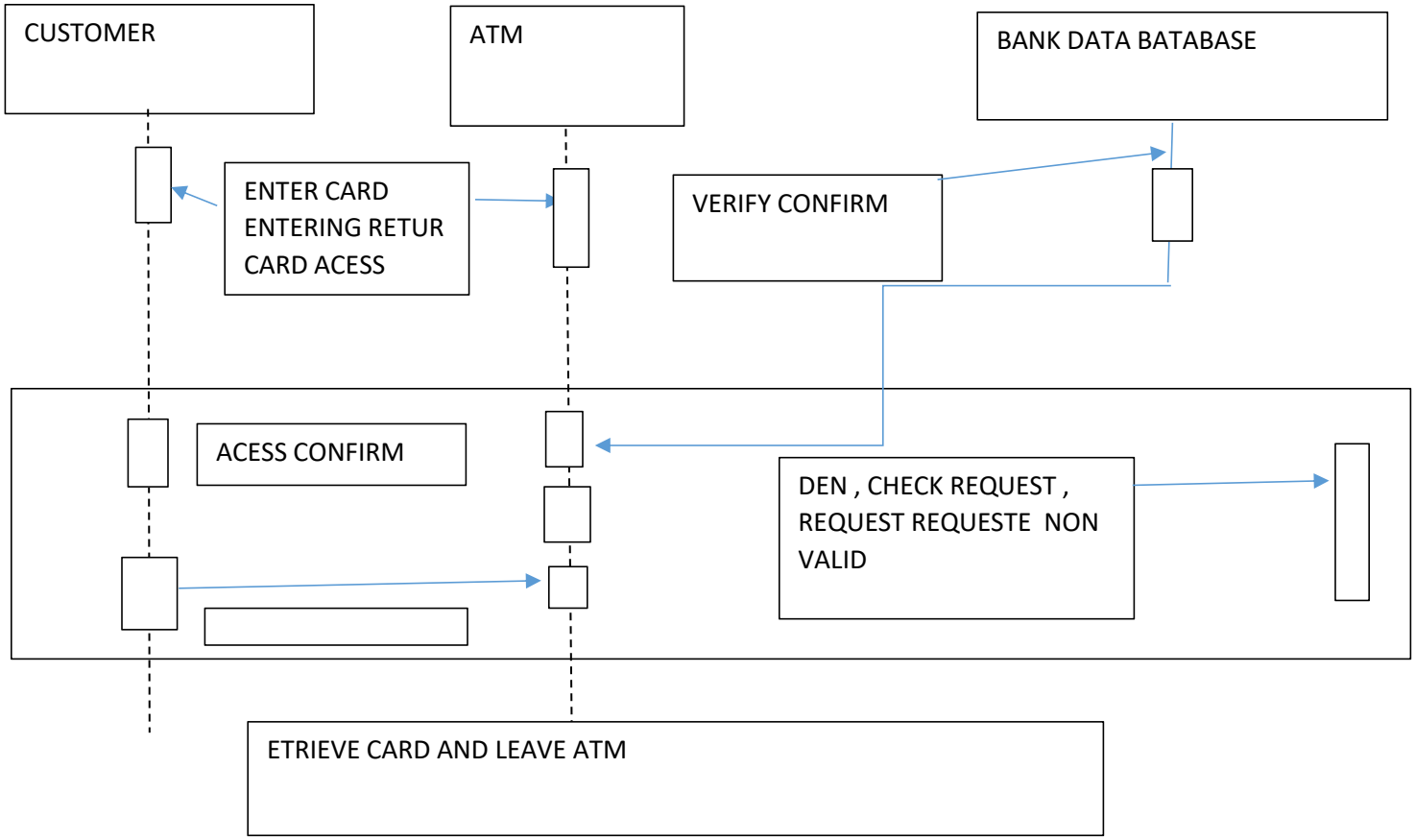
Citation publicity

BANK ATM , INTERNAL STRUCTURE



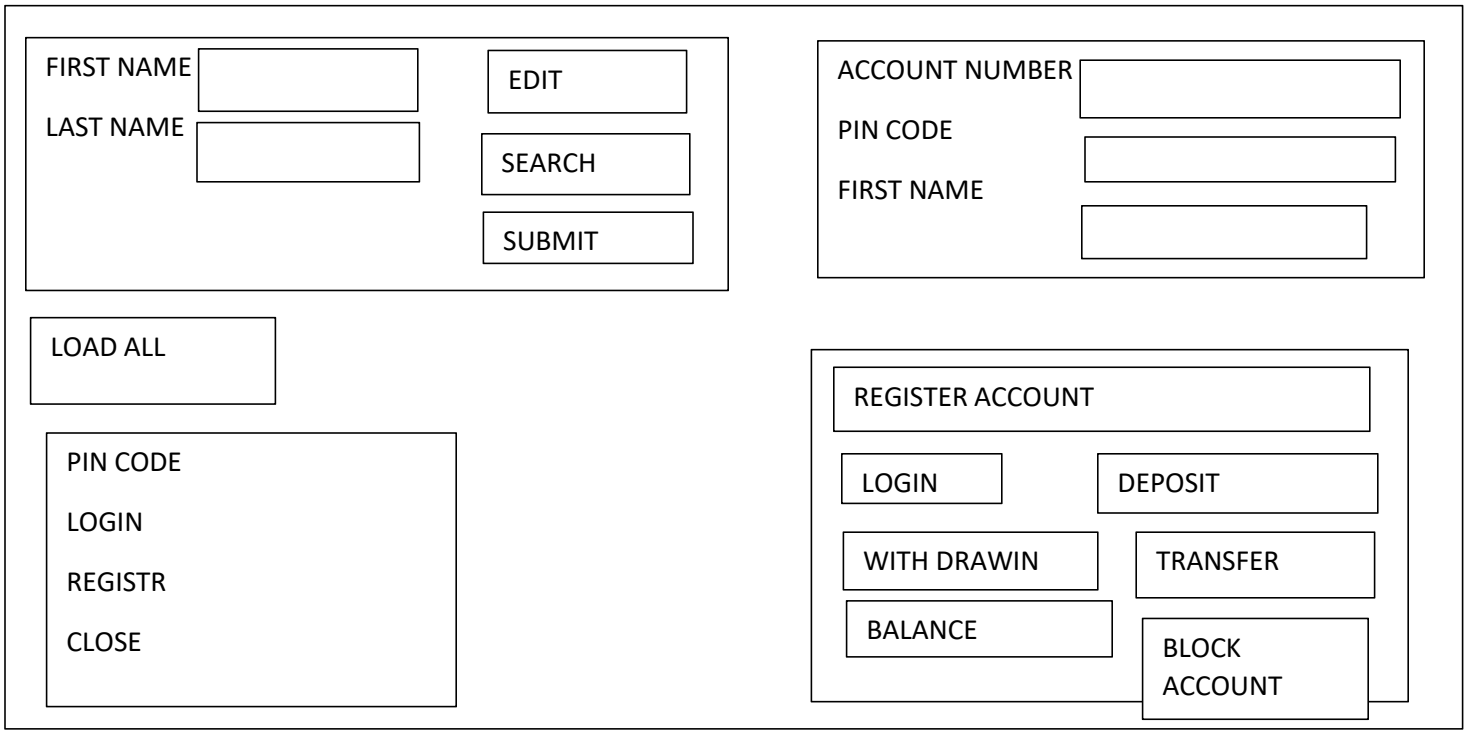
ATM SWITCH ATM , 155 MPS FROM





SEQUENCE , DIAGRAME , FLOW CHART , TEMPLATE , ORG CHART TEMPLE , CONCEPT RAP , TEMPLATE, WEB , FISH , ANALYSE , VERN DIAGRAM , NETWORK DIAGRAM, USE CASE , WIRE FRAME

AUTOMATED TELLER MACHINE SYSTEM IN VB NET AND MS ACCES DATABSE WITH



- VISUAL BASIC ATM PROGRAM :sten .object by e as system . event) hand
- Public class transaction box
- Const service – charge as decimal =6.5
- Const pin as integer +9343
- Dim balance as decimal =150
- Private sub label 12 _click (by val sender as system .object, by val e as system . event args)handles label /2.click
- End sub
- Private radio button 5 _ checked changed (by val .sender as system . object , by val as system args)hales.
- Top up button. Checked changed
- Private sub transaction sgbox _load by val sender as system object by val as sytem .event arg my base load
- End sub
- Private fuction deposit (by ref amount as decimal
- Balance=amount
- Return balance
- End function
- Private sub button 1_click (by val sender as system .object by val e as system . event arg) hand clear button .click
- If pin box .text+”9343” then
- Transaction group . enabled+ prview button . enable +true ,pin box enable =false
- Else
- Message box.show(icorrect pin , try again “’”pin error, message box buttons , ok message icon . exclamation
- End if
- End sub .

License award : trade mark

License certificate competence

License facilitate compense

Business certificate

Juridicion protection legal

Program

Term

purpose

License

Issue license

Issue license name

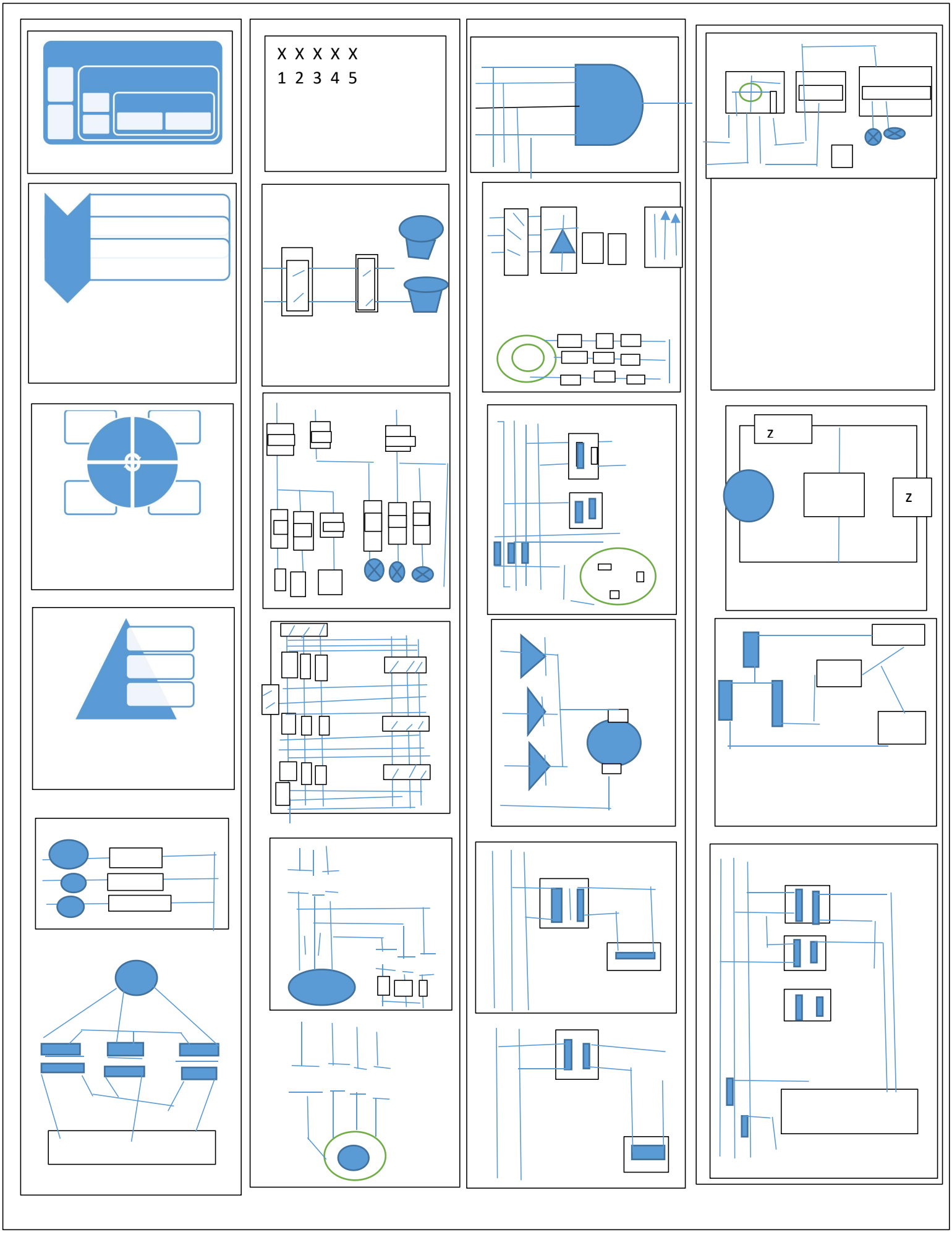
Issue

Algorithm license

Adresss;

Policy

Certificate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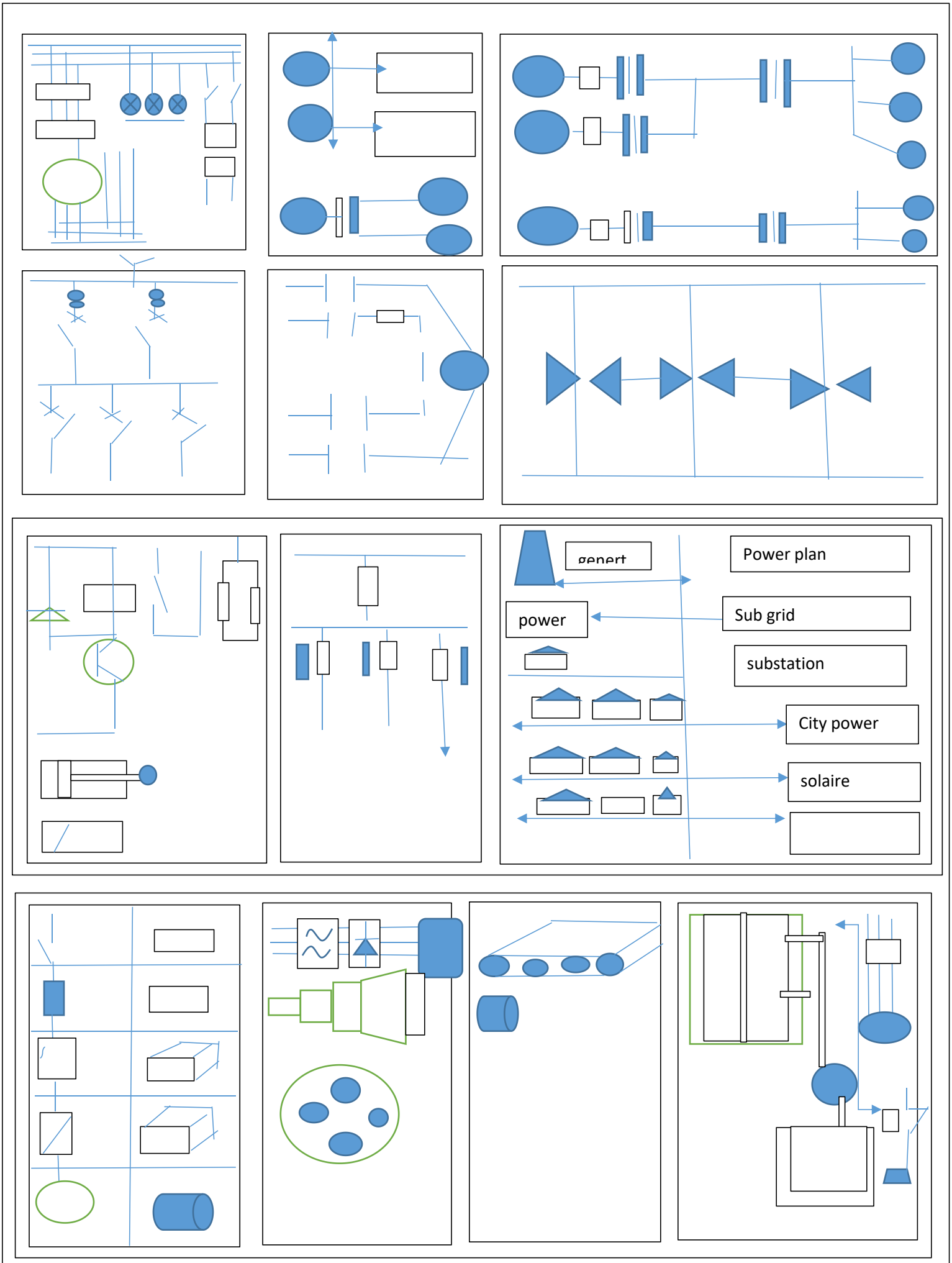
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Sub grid
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City power
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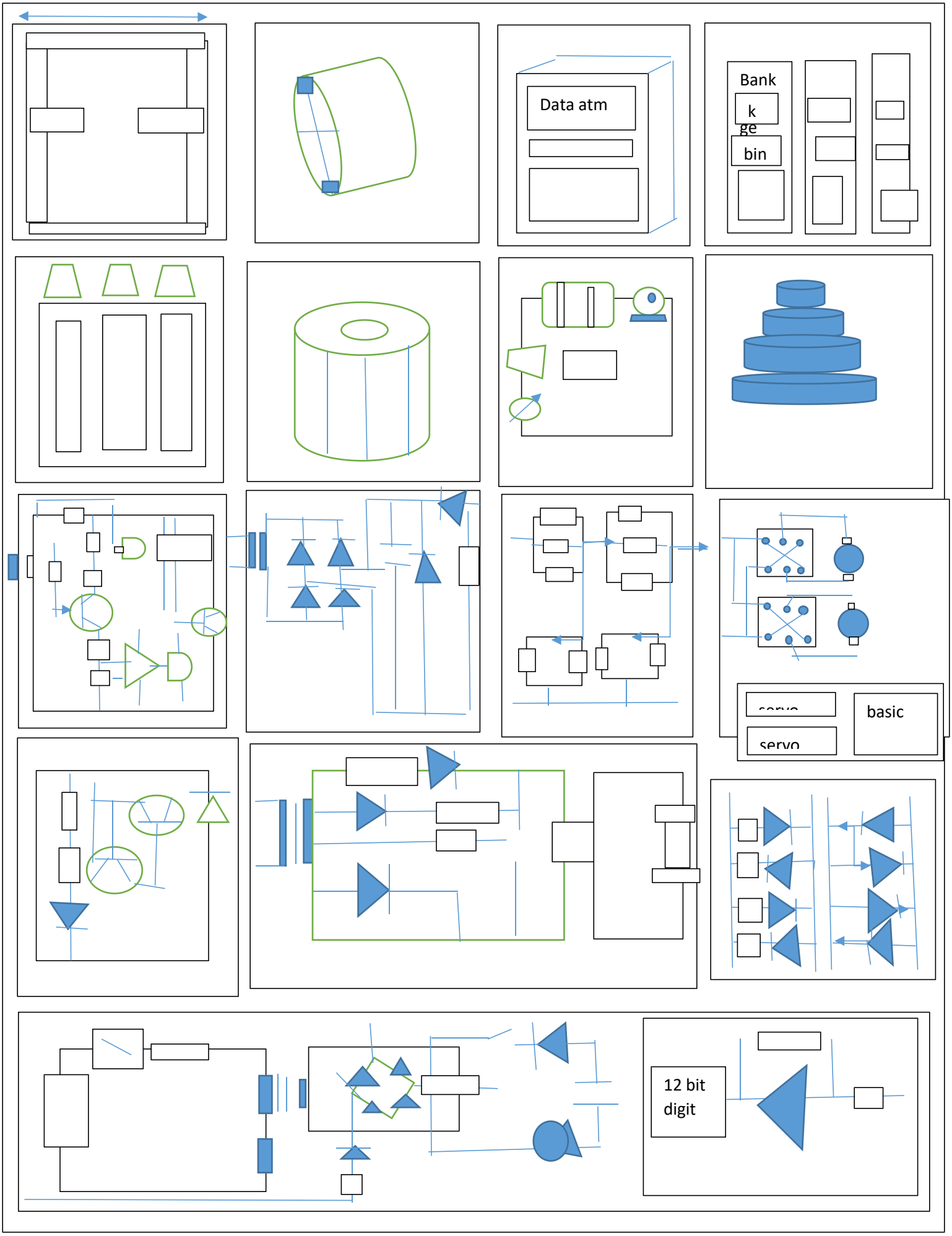
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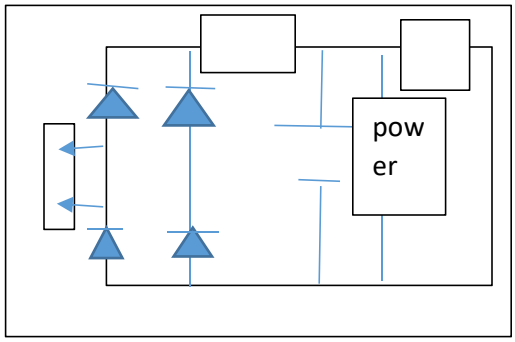
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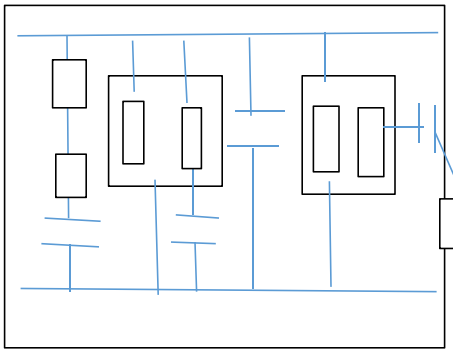
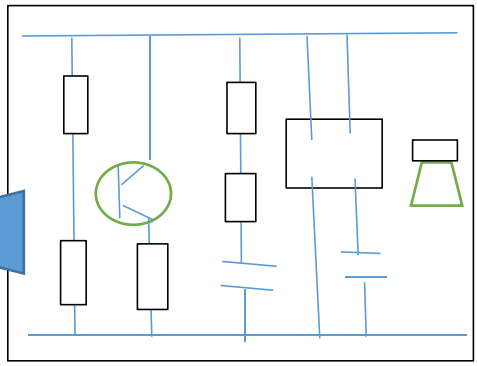
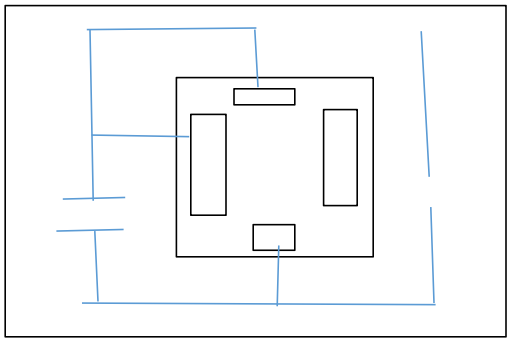
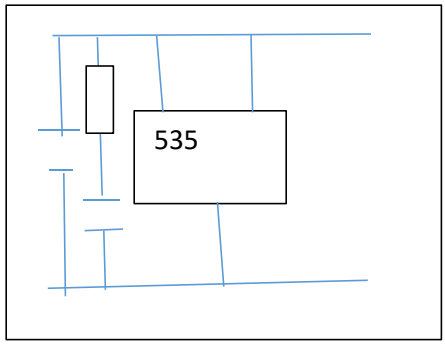
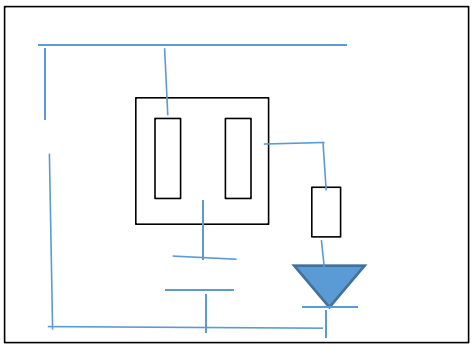
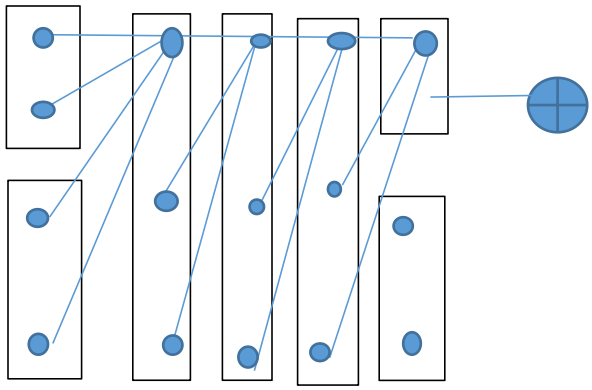


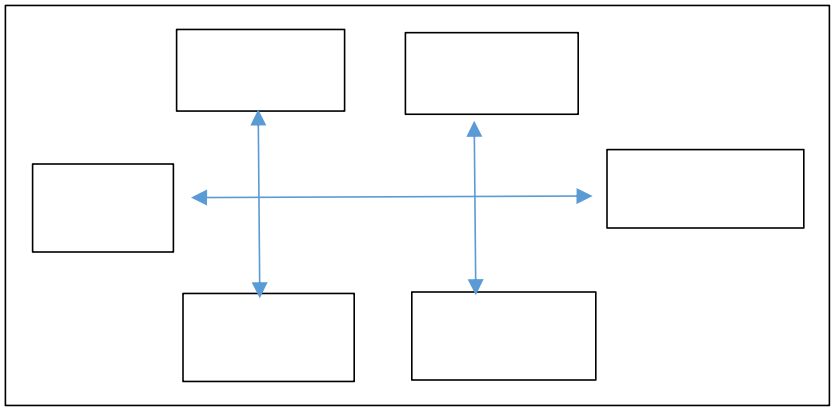


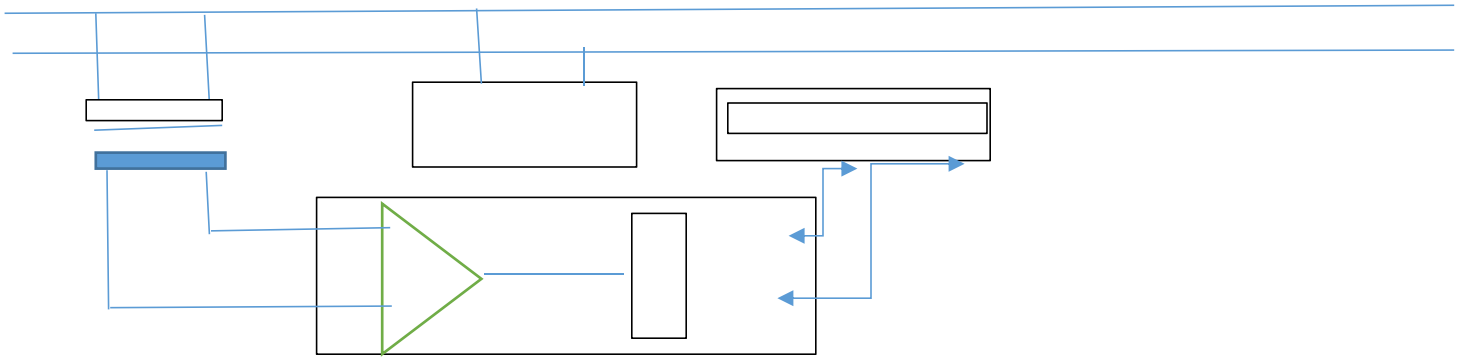


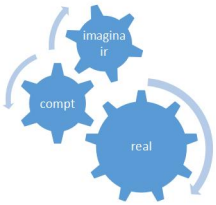

535

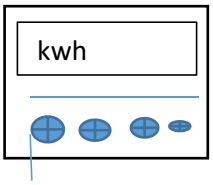


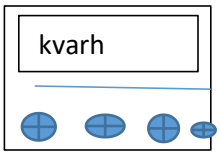




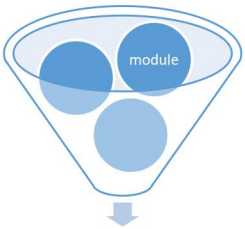


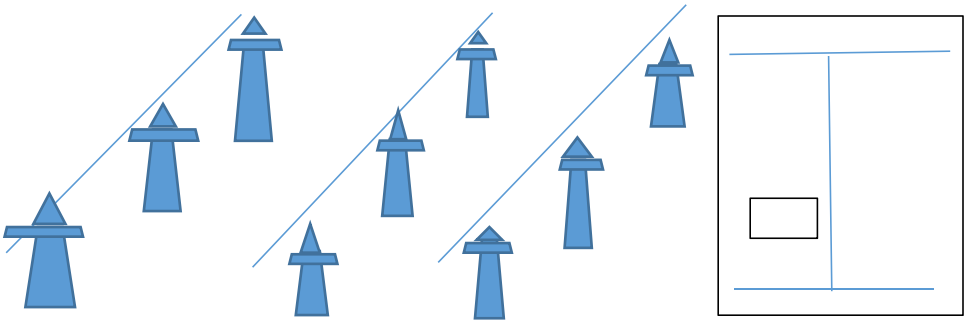


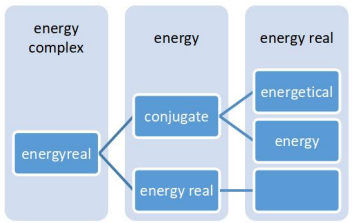


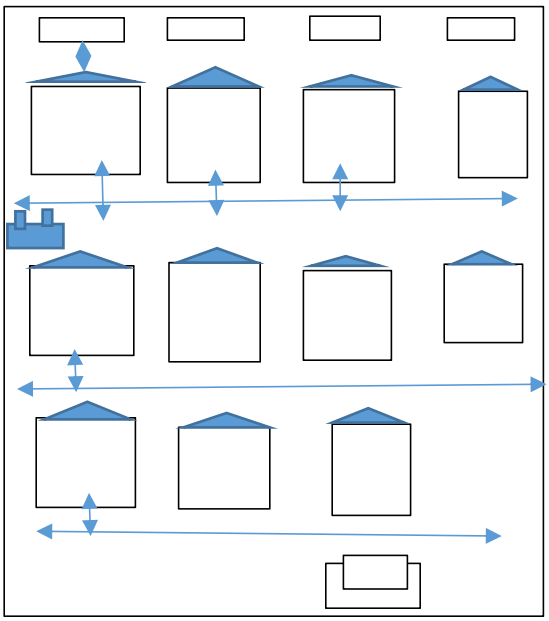


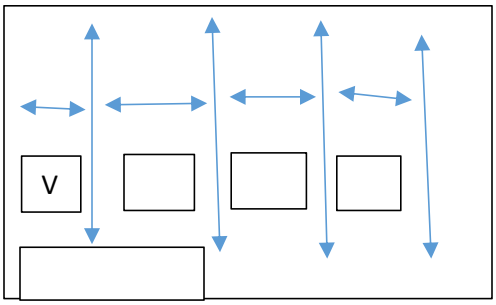
Kwh	Xkwh	X1	X2	X3	X4	X5	X6	X8
Kvah								
Vah								
Toa.								

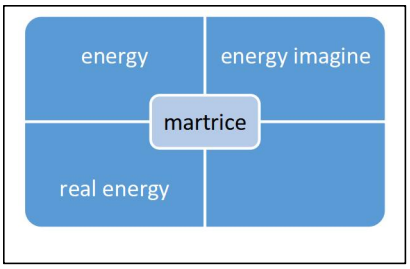


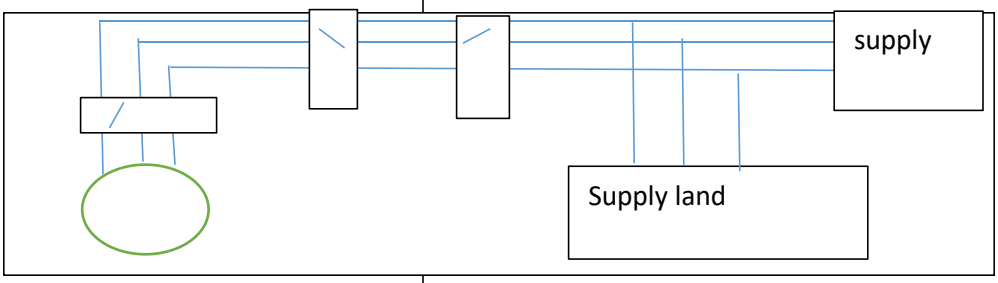


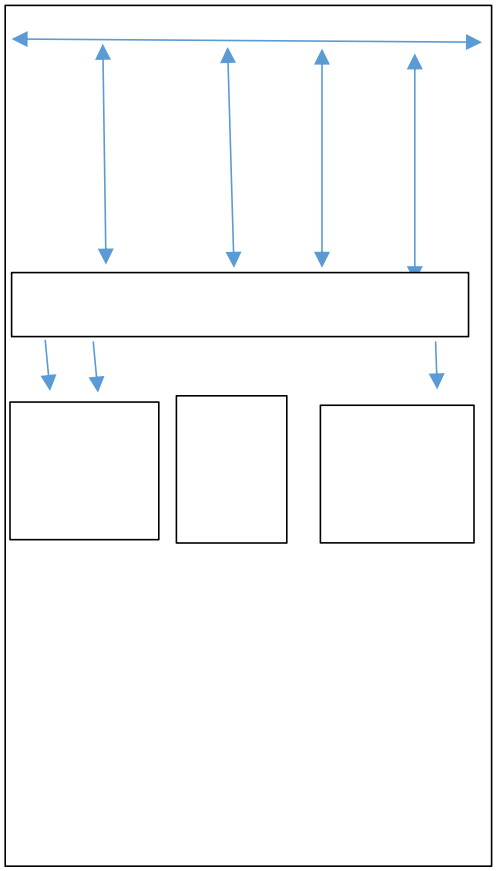


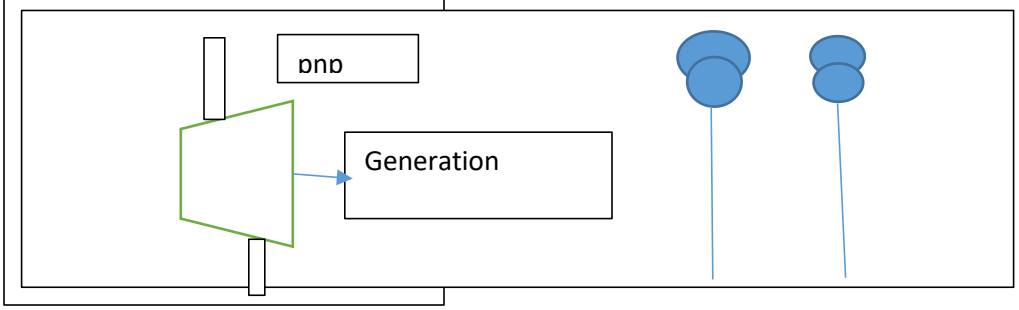


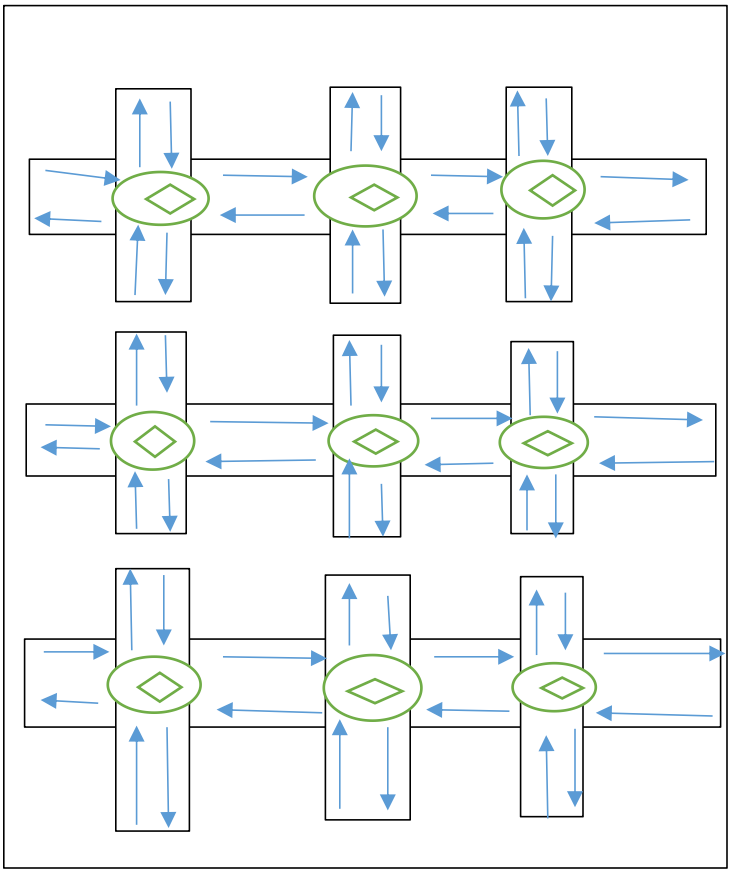


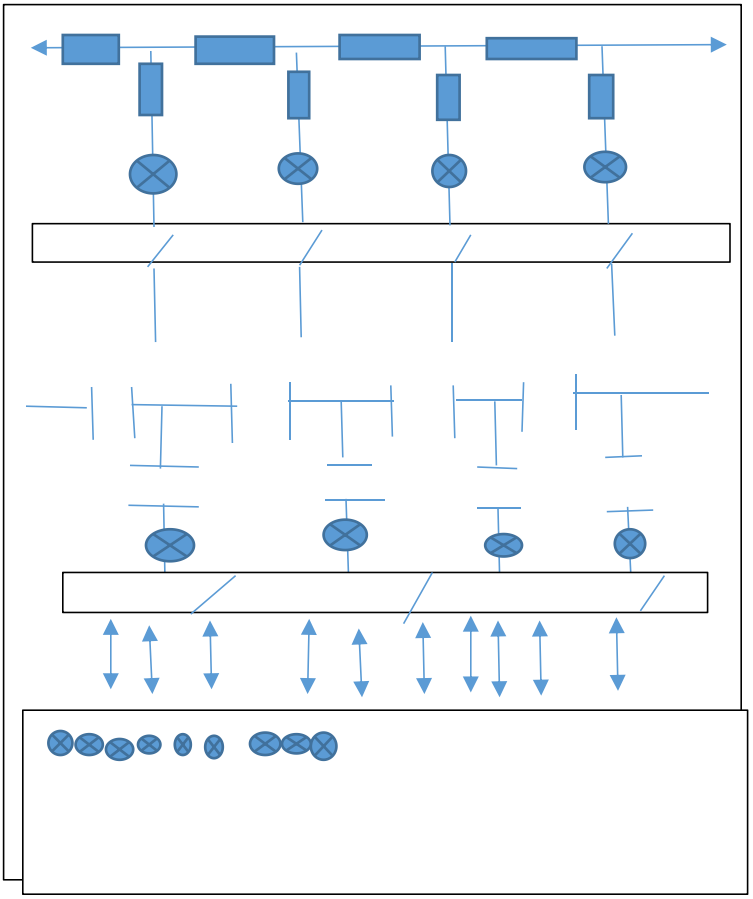


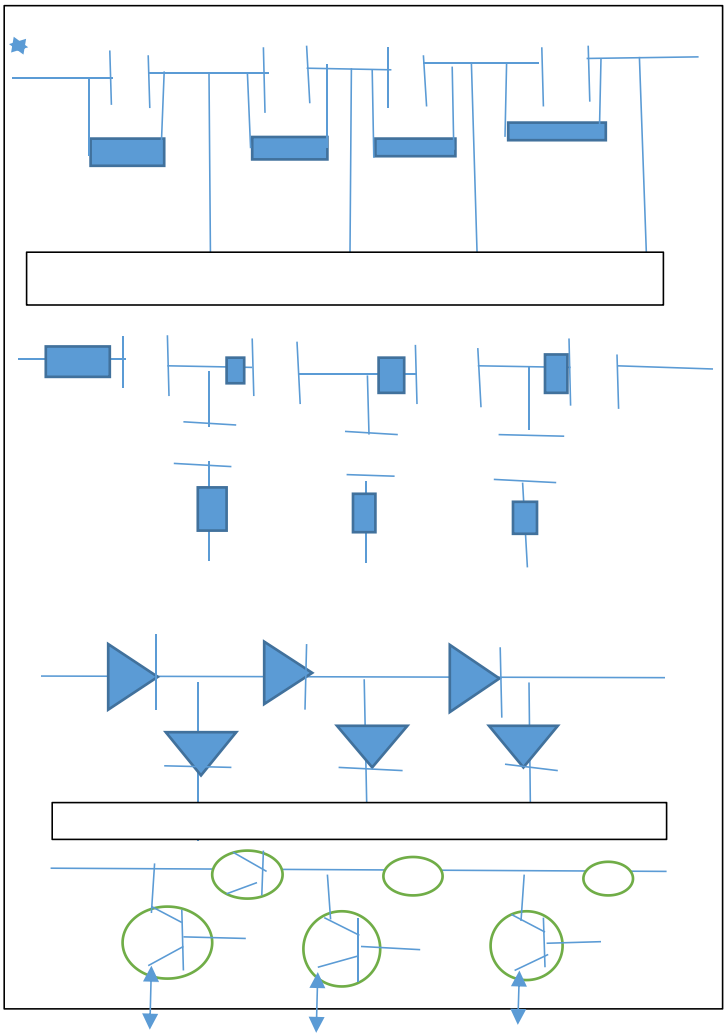


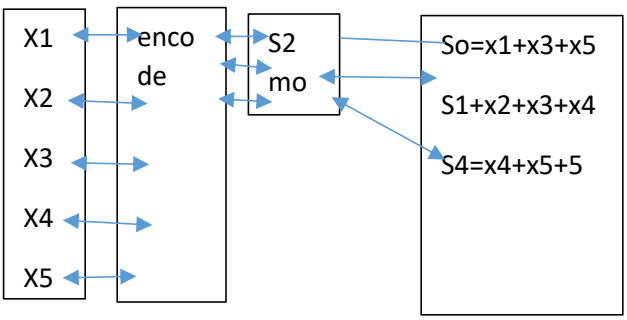




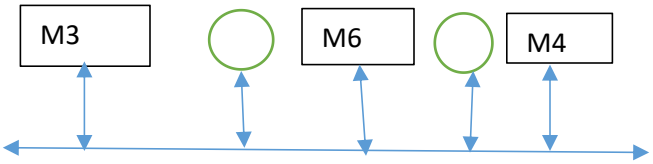


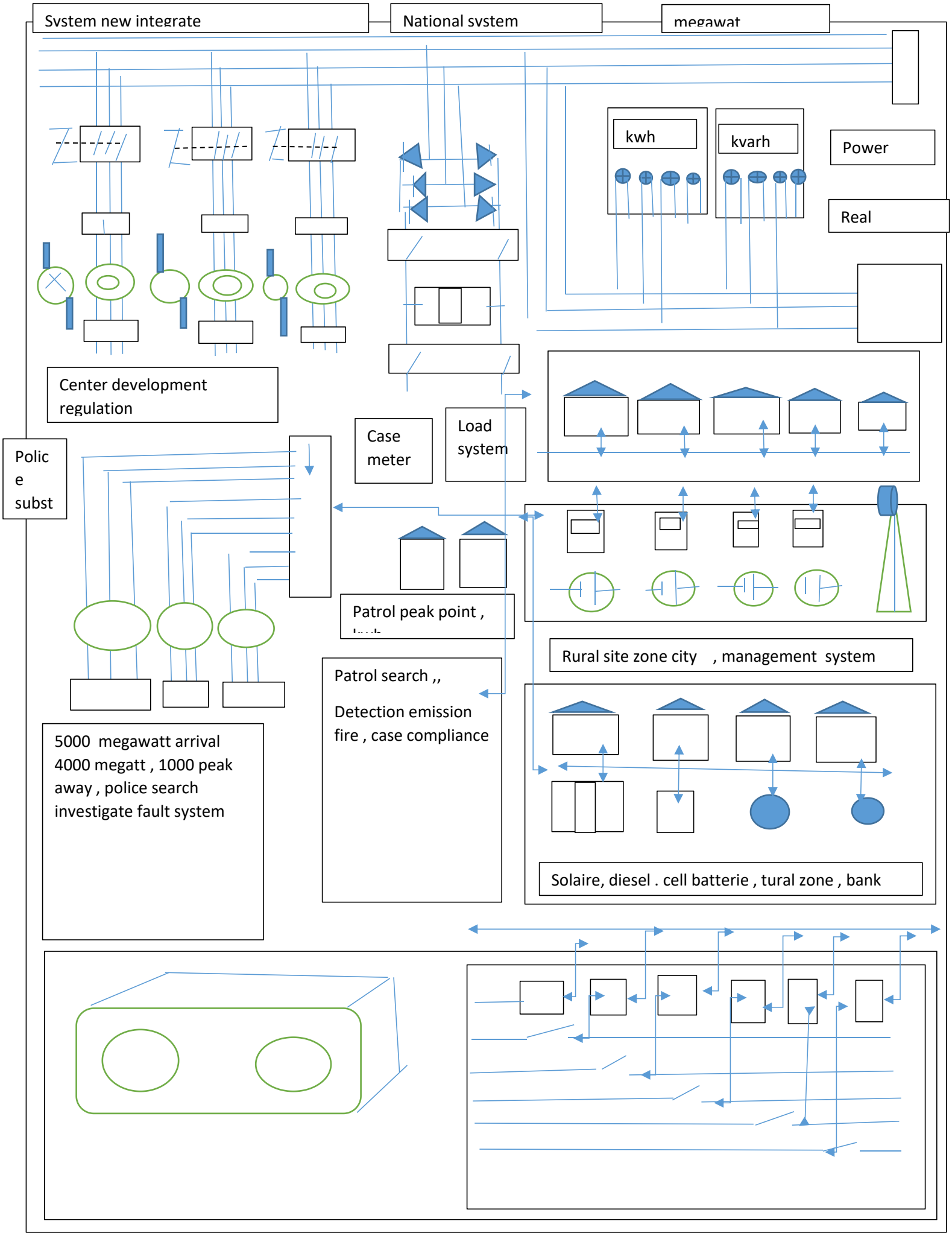






Input							output				
X1	X2	X3	X4	X5	X6	X7	S1	S2	S0	Reg select	Ha vir
0	0	0	0	0	0	0	0	0	0	0	0




System new integrate
National system
megawat
kwh
kvarh
Power
Real
Center development regulation
Case meter
Load system
Polic e subst
Patrol peak point ,
Rural site zone city , management system
Patrol search ,,
Detection emission fire , case compliance
5000 megawatt arrival 4000 megatt , 1000 peak away , police search investigate fault system
Solaire, diesel . cell batterie , tural zone , bank

jax	X1	X2	X3	X4	X6	X7	X10	X11	X12	X13	X13	X14	X15	X16
BATTERIEd								x						
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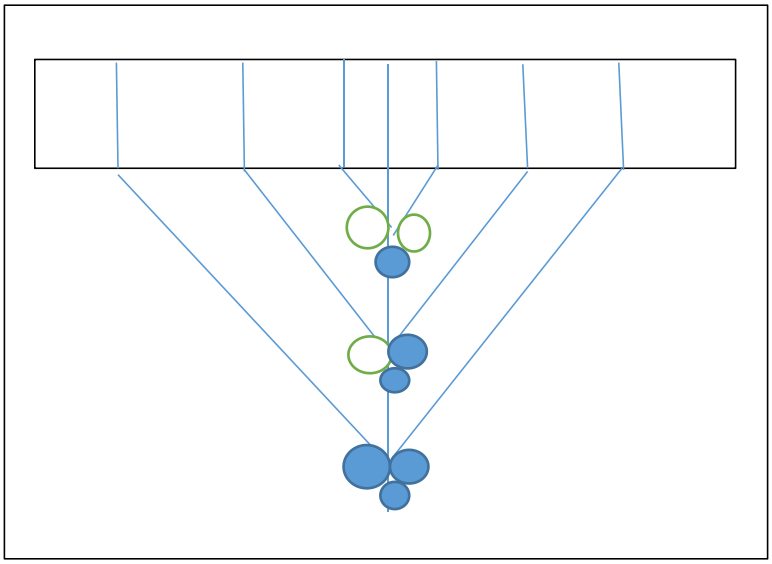
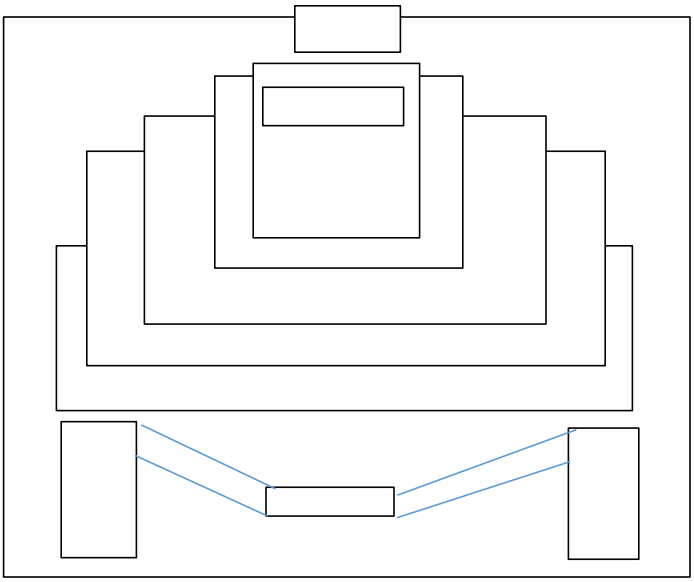




```
frm1 - 1
Private Sub ComboBox1_Change()
End Sub
Private Sub ComboBox2_Change()
End Sub
Private Sub ComboBox3_Change()
End Sub
Private Sub ComboBox4_Change()
End Sub
Private Sub ComboBox5_Change()
End Sub
Private Sub CommandButton1_Click()
End Sub
Private Sub CommandButton2_Click()
End Sub
Private Sub CommandButton3_Click()
End Sub
Private Sub Frame1_Click()
End Sub
Private Sub Label1_Click()
End Sub
Private Sub Label2_Click()
End Sub
Private Sub Label3_Click()
End Sub
Private Sub Label5_Click()
End Sub
Private Sub Label6_Click()
End Sub
Private Sub TextBox1_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean, ByVal Data As
MSForms.DataO
bject, ByVal X As Single, ByVal Y As Single, ByVal DragState As MSForms.fmDragState, ByVal Effect As M
SForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub TextBox1_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean, ByVal Action As
MSForms.
fmAction, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal Effect As MSFo
rms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub TextBox1_Change()
End Sub
Private Sub TextBox1_DblClick(ByVal Cancel As MSForms.ReturnBoolean)frm1 - 2
End Sub
Private Sub TextBox1_DropButtonClick()
End Sub
Private Sub TextBox1_Enter()
End Sub
Private Sub TextBox1_Error(ByVal Number As Integer, ByVal Description As MSForms.ReturnString, ByVal S
Code As Long, ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, ByVal Cance
lDisplay As MSForms.ReturnBoolean)
End Sub
Private Sub TextBox1_KeyDown(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub TextBox1_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)
End Sub
Private Sub TextBox1_KeyUp(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
```

```
End Sub
Private Sub TextBox1_MouseDown(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV
al Y As Single)
End Sub
Private Sub TextBox1_MouseMove(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV
al Y As Single)
End Sub
Private Sub TextBox1_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal
Y As Single)
End SubUserForm1 - 1
Private Sub CommandButton1_Click()
End Sub
Private Sub CommandButton2_Click()
End Sub
Private Sub CommandButton3_Click()
End Sub
Private Sub Frame1_Click()
End Sub
Private Sub Label1_Click()
End Sub
Private Sub Label3_Click()
End Sub
Private Sub Label5_Click()
End Sub
Private Sub TextBox1_Change()
End Sub
Private Sub TextBox2_Change()
End Sub
Private Sub TextBox3_Change()
End Sub
Private Sub TextBox4_AfterUpdate()
End Sub
Private Sub TextBox4_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean, ByVal Data As
MSForms.DataO
bject, ByVal X As Single, ByVal Y As Single, ByVal DragState As MSForms.fmDragState, ByVal Effect As M
SForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub TextBox4_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean, ByVal Action As
MSForms.
fmAction, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal Effect As MSFo
rms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub TextBox4_BeforeUpdate(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub TextBox4_Change()
End Sub
Private Sub TextBox4_DblClick(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub TextBox4_DropButtonClick()
End SubUserForm1 - 2
Private Sub TextBox4_Enter()
End Sub
Private Sub TextBox4_Exit(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub TextBox4_KeyDown(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
```

```
Private Sub TextBox4_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)
End Sub
Private Sub TextBox4_KeyUp(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub TextBox4_MouseDown(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV
al Y As Single)
End Sub
Private Sub TextBox4_MouseMove(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV
al Y As Single)
End Sub
Private Sub TextBox4_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal
Y As Single)
End Sub
Private Sub UserForm_Click()
End SubUserForm3 - 1
Private Sub ComboBox1_Change()
End Sub
Private Sub CommandButton1_Click()
End Sub
Private Sub CommandButton2_Click()
End Sub
Private Sub CommandButton3_Click()
End Sub
Private Sub Label1_Click()
End Sub
Private Sub ListBox1_Click()
End Sub
Private Sub SpinButton1_AfterUpdate()
End Sub
Private Sub SpinButton1_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean, ByVal Data As
MSForms.Da
taObject, ByVal X As Single, ByVal Y As Single, ByVal DragState As MSForms.fmDragState, ByVal Effect A
s MSForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub SpinButton1_BeforeUpdate(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub SpinButton1_Change()
End Sub
Private Sub SpinButton1_Enter()
End Sub
Private Sub SpinButton1_Exit(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub SpinButton1_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)
End Sub
Private Sub SpinButton1_KeyUp(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub SpinButton1_SpinDown()
End SubUserForm5 - 1
Private Sub ComboBox1_Change()
End Sub
Private Sub UserForm_Activate()
End Sub
Private Sub UserForm_AddControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean, ByVal Control As
MSForms
```

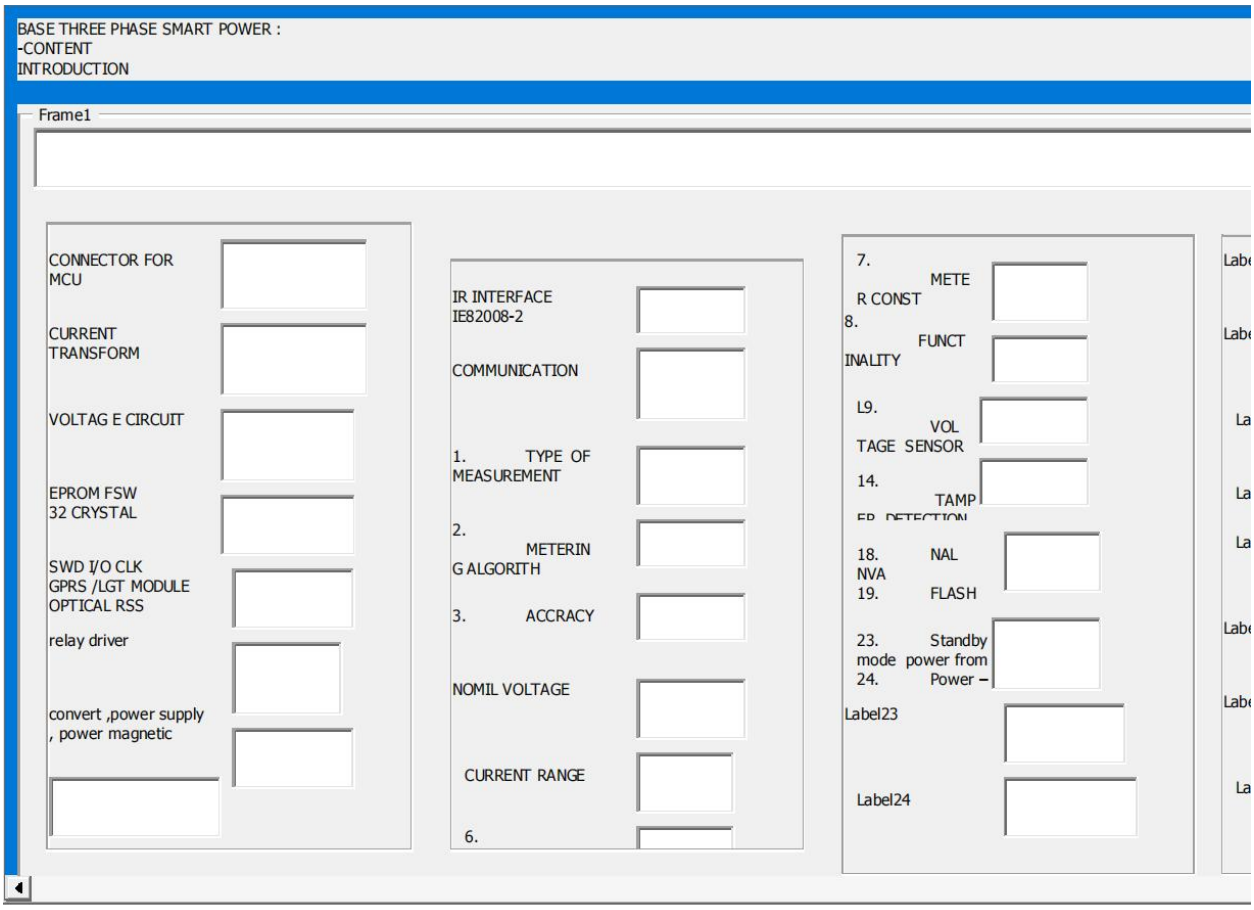
```
.Control, ByVal Action As MSForms.fmAction, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal
Y As Single, ByVal Effect As MSForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub UserForm_Click()
End Sub
Private Sub UserForm_Error(ByVal Number As Integer, ByVal Description As MSForms.ReturnString, ByVal S
Code As Long, ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, ByVal Cance
lDisplay As MSForms.ReturnBoolean)
End Sub
Private Sub UserForm_Initialize()
End Sub
Private Sub UserForm_KeyDown(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub UserForm_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)
End Sub
Private Sub UserForm_MouseDown(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV
al Y As Single)
End Sub
Private Sub UserForm_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal
Y As Single)
End Sub
Private Sub UserForm_RemoveControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_Resize()
End Sub
Private Sub UserForm_Terminate()
End SubUserForm7 - 1
Private Sub ComboBox1_Change()
End Sub
Private Sub ComboBox2_Change()
End Sub
Private Sub CommandButton1_Click()
End Sub
Private Sub CommandButton2_Click()
End Sub
Private Sub CommandButton3_Click()
End Sub
Private Sub CommandButton5_Click()
End Sub
Private Sub CommandButton6_Click()
End Sub
Private Sub CommandButton8_Click()
End Sub
Private Sub CommandButton9_Click()
End Sub
Private Sub Label1_Click()
End Sub
Private Sub Label2_Click()
End Sub
Private Sub Label3_Click()
End Sub
Private Sub Label5_Click()
End Sub
Private Sub ListBox1_Click()
End Sub
Private Sub ScrollBar1_Change()
```

```
End Sub
Private Sub UserForm_Activate()
End Sub
Private Sub UserForm_Click()
End SubUserForm8 - 1
Private Sub Frame1_Click()
End Sub
Private Sub Frame3_Click()
End Sub
Private Sub Frame5_Click()
End Sub
Private Sub Label13_Click()
End Sub
Private Sub Label14_Click()
End Sub
Private Sub Label5_Click()
End Sub
Private Sub TextBox11_Change()
End SubModule2 - 1Module3 - 1
Sub frm1()
End SubModule4 - 1
Private Sub CommandButton1_Click()
End Sub
Private Sub CommandButton2_Click()
End
Caption = "UserForm1"
ClientHeight = 8664
ClientLeft = 108
ClientTop = 456
ClientWidth = 19884
OleObjectBlob = "frm1tshingombe.frx":0000
StartUpPosition = 1 'CenterOwner
WhatsThisButton = -1 'True
WhatsThisHelp = -1 'True
End
Attribute VB_Name = "frm1"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
End Sub
End Sub
End Sub
End Sub
Private Sub Frame1_Click()VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm3
Caption = "UserForm3"
ClientHeight = 7476
ClientLeft = 108
ClientTop = 456
ClientWidth = 19812
OleObjectBlob = "UserForm3tshingombe.frx":0000
StartUpPosition = 3 'Windows Default
WhatsThisButton = -1 'True
WhatsThisHelp = -1 'True
End
```

```
Attribute VB_Name = "UserForm3"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = FalseNewMacros - 1
Sub Macro1()
'
' Macro1 Macro
' visual basic atm program .sten object by system .event )hand
' "&chr(10)&"public class transaction box
' "&chr(10)&"const service as decimal =6.5
' "&chr(10)&"const pin as integer +9343
' "&chr(10)&"dim balance as decimal =150
' "&chr(10)&"private sub label 12_click (by sender System.object event arg handles labe
'
End SubClass3 - 1Class4 - 1
Private Sub CommandButton1_Click()
End Sub
Private Sub CommandButton2_Click()
End Sub
Private Sub CommandButton3_Click()
```

```
UserForm9 - 1
Private Sub Frame3_Click()
End Sub
Private Sub TextBox6_Change()
End SubBASE THREE PHASE SMART POWER :
-CONTENT
INTRODUCTION
SERIES MKM35512 SERIES
CONNECTOR FOR
MCU
CURRENT
TRANSFORM
VOLTAG E CIRCUIT
EPROM FSW
32 CRYSTAL
SWD I/O CLK
GPRS /LGT MODULE
OPTICAL RSS
OPTICAL
relay driver
convert ,power supply
, power magnetic
IR INTERFACE
IE82008-2
COMMUNICATION
1. TYPE OF
MEASUREMENT
2.
METERIN
G ALGORITH
3. ACCRACY
NOMIL VOLTAGE
CURRENT RANGE
6.
NOMIN
7.
METE
```

R CONST
8.(IMP/KWH,M /K
FUNCT
INALITY
L9.
VOL
TAGE SENSOR
10.
14.
TAMP
ER DETECTION
18. NAL
NVA
19. FLASH
20.
23. Standby
mode power from
24. Power –
down power
Label23
Label24
Label25
Label26
Label27
Label28
Label29
Label30
Label31
Label32
Frame1


BASE THREE PHASE SMART POWER :
-CONTENT
INTRODUCTION
Frame1
CONNECTOR FOR MCU
CURRENT TRANSFORM
VOLTAG E CIRCUIT
EPROM FSW 32 CRYSTAL
SWD I/O CLK GPRS /LGT MODULE OPTICAL RSS
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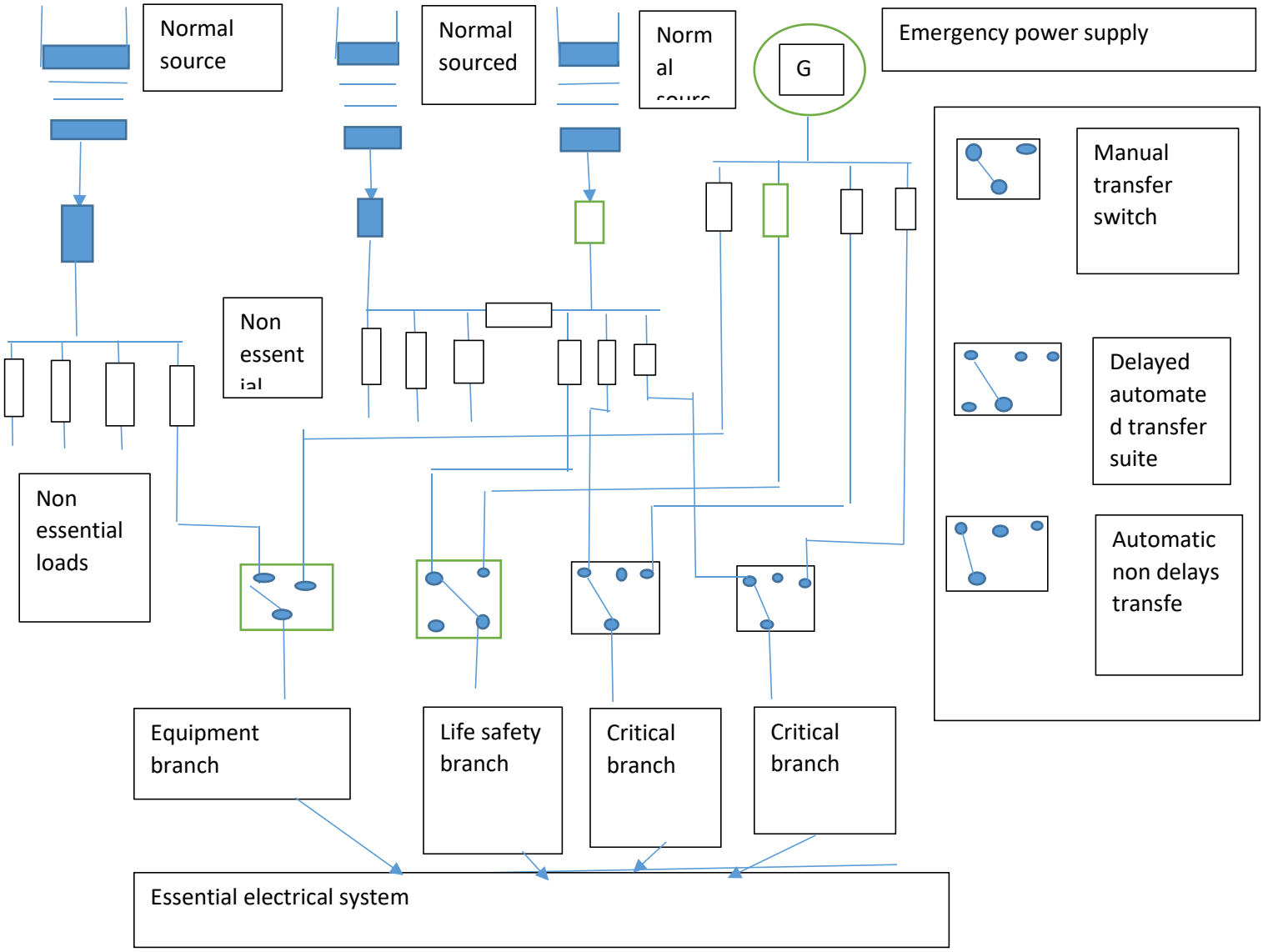
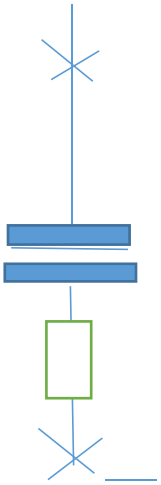
Label23
Label24



Power distribution system , typical application by facility type 10, class class x level 1, generation nfpa ,power the load maximum of 19 second series automatic transfer ,, health ..



13,8KV

X/R=15

375MVA

13,8KV

3750KVA

4,16KV

ADVANCED BASIC ESSENTIAL

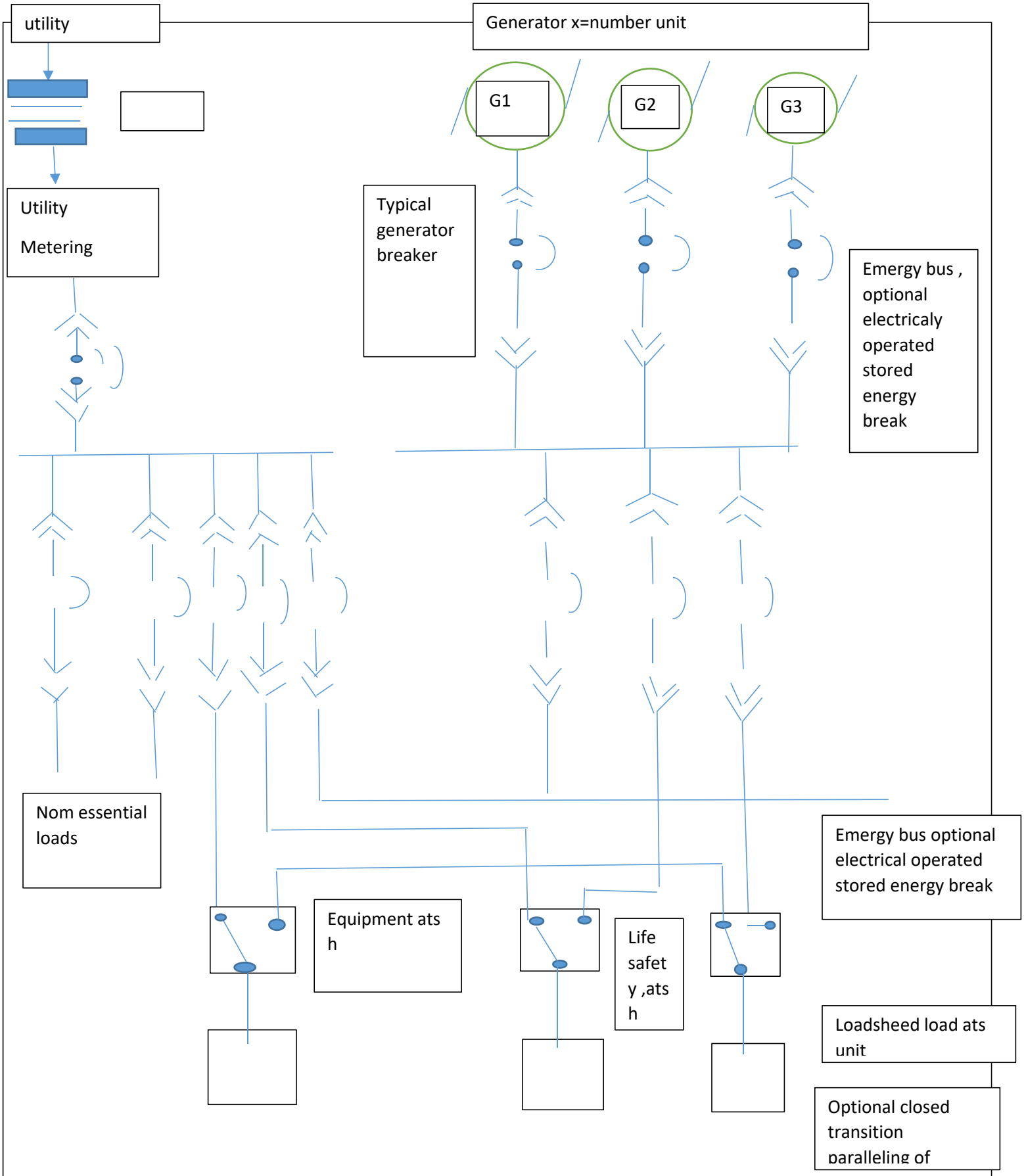
Z= $R^2 + (XL + XC)$

1/Z=

G

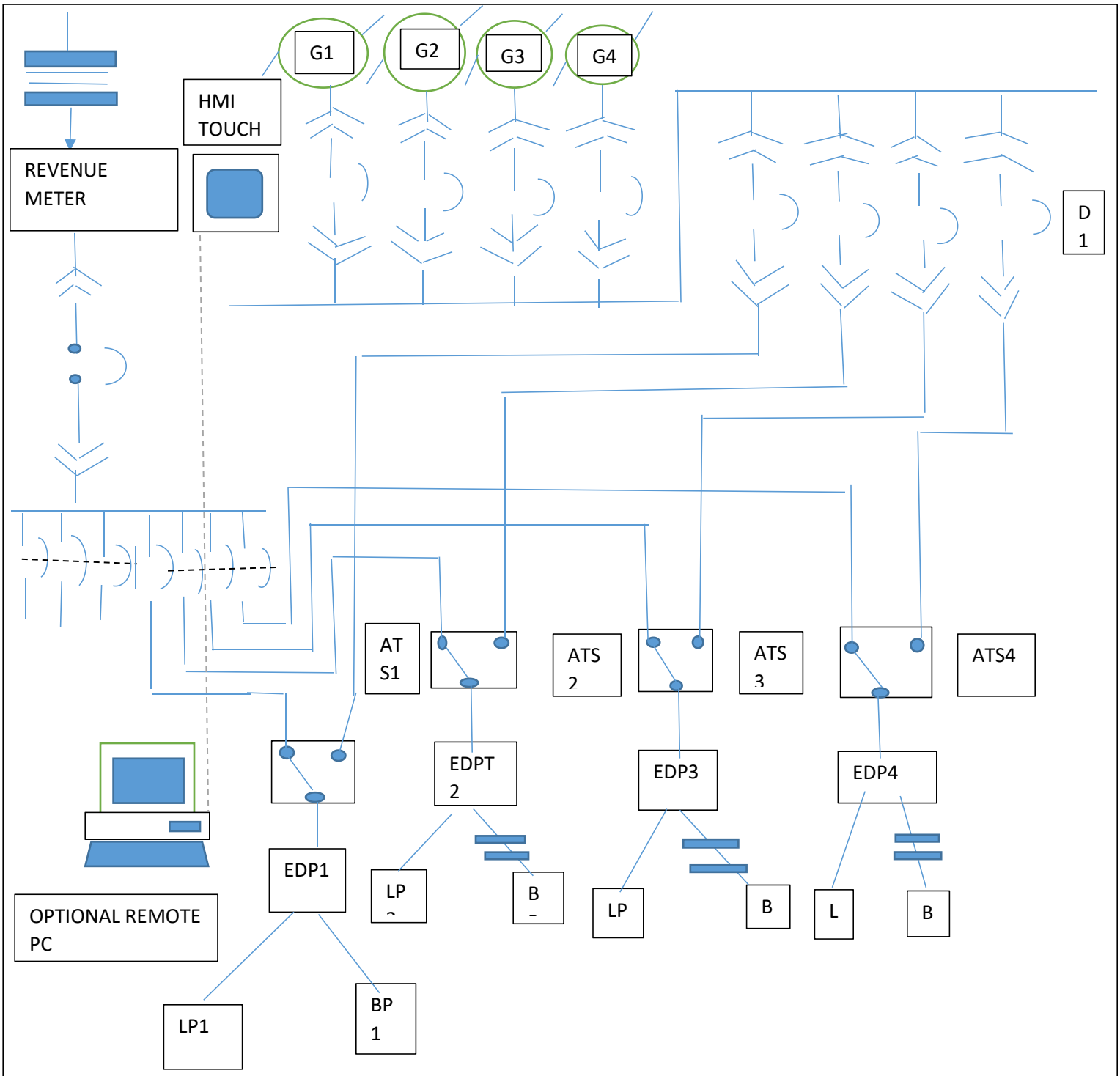
1/G=

1/R

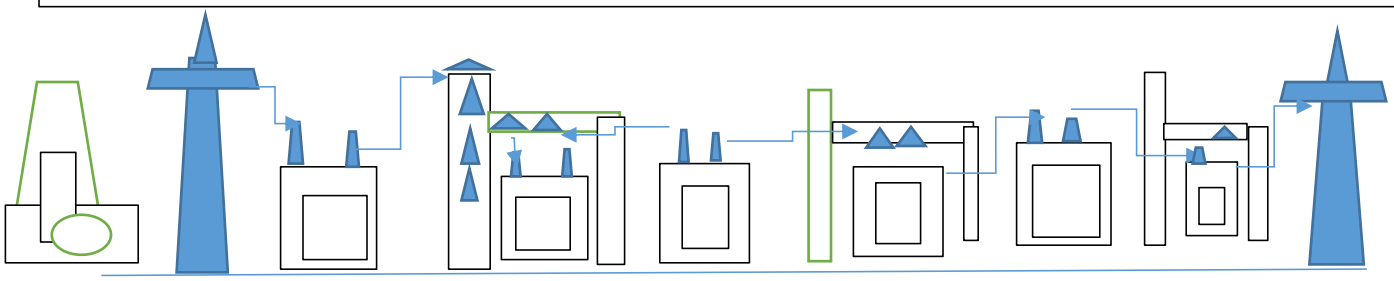


Feeing essential electrical system ,, /

Typical –one-line for paralleling switch gears



TYPICAL EMERGENCY POWER ,TYPICAL THREE ENGINE GENERATOR SET SERVE THE LOAD PLUS ONE ADDITIONAL ENGINE GENERATOR SET FOR REDUNDANCY TO ACHIEVE N+ LEVEL OF PERFORMANCE OPEN OR CLOSED TRANSIT



Breakers calculat on a symmetrical current rating : fault calculation : on note interrupted capabilities ,I1,and ,I2,a
- 13,8 kV ,,breakers x/R= 15, 375 MVA,transfo 13,8 kV primary ,3750kva , secondary ,4,16 ,,,50vpc ,w
On system,13,8 kV system ,3,75 MVA base ,
Z=3.75MVA/375,,= 0,01 Pu or 1%
Z^2=X^2+RR^2=R^2(x^2/R^2+1)
R=Z/√x^2/R^2+1=1/√266=1/15.03=0,066%
X=X/R(R)=15(0,0066)=99%
Transformer standard standard ,5,5% impedance has ,+ 75 manufacture toleri,
Transformer standard ,5,5% impedance ..
From transformer loss per unit percent ,R is calcul .
31,000 watts full load
-6,800 watt no load load
_____
24,209 watt load losses
R= 24,2kw/3750 KVA = 0,0065 Pu or ,0,65%
- transform x = √ z^ 2-R^2.√(5.09)^2-(0,65)^2=√25.9 ^2-0,42=√25,48=5,05%
_____

	X.	R.	X/ R
13,8 kV system	0,98%.	0,066%.	15
Transfo.	5,05%.	0,65%.	8
Systt total.	0,04%.	0,76%.	8

.tree

For three phase ,i3 phase = E/x ,,
X ohm ..
I3 phase = IB/X,, IB is base ,,
- base current IB = 3,75MVA/√3(4,16Kv)=0,52k.A
I3 phase = I1/ x = 0,52 /0,0604=8,6k, sym ,,syst ,x/ R= 9 is less 15
Duty circuit ,is 8,6 ka three phase I and moment ..
8,6× 1,6 = 13,7 KA. I 3
- for line - to grounv fault ,
ILG = 3E/2x1+X0=4IB/2x1+xo ,xo is seauet reactance transformer positive ..
ILG= 3(0,52)/2+0,0604)+(0,0505=9,@KA sym ..

The ,50 vcp ,, applied,z= x ,in= x = 0,52/0,55=9,5ka stm ,
X/ R ration ,15 or less multiot ,10 for short circuit bdury ,short circuit duty is then 8,5 kA ,sym ,(I1,I2) and momen
_____
Design distributor system
drawing note / build..

_____
1.***4.1.2.5.***Fault calculation check break application or generator bus for the system generator shoe each generato
pu ,
Gen ,x/R ratio ,30.

1/X's= 1/x+1/x+1/x== 3and 1/Rs= 1/R+;1/R+1/R=3/R..
X's= x/3and Rs ,= Rs=R/3,, system ,X's/Rs = x/R= gen .x/R=39,, generator neutral grounding reactor are used to lin
Amper ,system ,x/R of I multiple b..short circuit duty is 28,4 (29,5 symetricaj ..
-Three phase symmetrical interri capacity
_____
Breaker type|vmax| max ki| at 4,16 op vo

1.***4.1.2.6.***Overview : research in training and .university and college ,cpd learning
campagnie work base : experiemental.
Module ,construction distribution system design

- describe between fault current peak ,value ,RMS symmetrical value .RMS , asymmetric value ,X/R ratio ,
I= symmetrical RMS current ,IP = peak current,e= 2,71,wv,= 2.p.f ..
Cycle (ANSI/IEEE.C37.13.2.2015..
-Design a distribution system.
-Developm of a system one - line ..imp, --_Standard drawing , additional d
rawing --schedule and specification
- power systems voltage ,
Voltage classified
- income service Volta,income consider
- type of system:
Power system analyse ,short current wave.
- fault current calculat, fault calculai for specifications,medium voltage ,breaker fault ,molded circuit breaker , int
Grounding ground fault ,

- typicK power systt generator and generator system ,generator short circuit ,caractt,generator set size ,rating ,g
- typical applicatt ,health facilities ,quickly generator and load bank ,power quality,
- power quality seism ,ampacities for conductor ,NPA 70-2014,
- safety goal power hazard oashs , NEC
- regulation requ

& Maximum flexibility ,minimum

- maximizing electrical minimy operating : loss conductor transfory .

: discussed further ,

- development phase : input plumbing construction v.
- construcy documents : project ..

Experiemental orientation guide workbase Manuel construction guidelines:

- electrical engineering

Electrician

Design. ,,

Z×A×U= .

ΔU.2L××Pxz×Z×A

..**schema electrical / drawing design

panel

_____&

- electrical power effect dynamic between 2 conduct ,3 conductor parallel , consumer power AC ,DC

Courent I1,I 2..

S= porter in cm ,a = distance in cm ,,

P= U× I.[W].IP.U

P=U×I×cos .flux ..IP × U× cos alph .

P= 3×I×I×cos [W] IP×3×U×cos flux

F2, 0,2×I@×2×s,a

=.....(N)

F3=0,808×F2[N]

F3=0,865×F2[N]

F3=0,865×F2[N]

-resistancd of conductor,L= ligth of conductor ,m aluminy,

- Z = conductivity, m /mm ion ,

A = across area conductor ,mm Sq..

- resistance = of coiling of induction condensator , L = inductance ,H ,f = frequency ,Hz ,,C = capacity ,f v= angle p
- series parallel installation ,

U=I×R[V].I.U..R=, R.I..ohmm × 33 m ,ohm m× 8,3 mm Sq × ohm

XL= 2×π×f×L, XC ,,2× π×f×c
{
=
ZR2(XL-XC)2=+ZR,,cos = --- ohm

RG, R1R2/R1+R2=..
R1R2×R×./ ..
Z..Z.@..Z2..=, X..X..

1.***4.1.2.5***1..Cable and conductor : value short circuit current ,,assignment current ,,
Transformation
- system design of cable conductor:
Cable PVC,0,75 mm , souple,H05V - K ,0,75 black ,,big cable coutchouc ,3 conductor = 2,5 mm ,,
- protection , green yellow , symbol h ,supply voltage ,300/ 300v,03,,$00/500,450/750v
Material insulation cable : caoutchouc naturej styrene ,butadiene silicon material,PVC ,styrene tressfibre
- construction specialist cable : meplat with conductor separe H,NHL ,,cable plastic gain ,cable concentric onduke
- characteristics of materials : polythylene ,elastic ,thermoplastic ,color ,grid degree Up ,stabilt chemit,alcol verni

Fuse motor tree phase value rotor squire ,(DIN VDE 0636,,
Control thermic ,,start delta over load max start ,2 × assignt current , max 5 sec ,, regulation 0,58,,
Switch ,switch gear ,,, close open circuit
Usage current ,
I = courent etablid ,IC = courent coupe,I e = courant assigned d employ ,u tension avant fermeture ,u r = tension
motor starting b,,power cut open close ,L/Rv,ms. Break current .

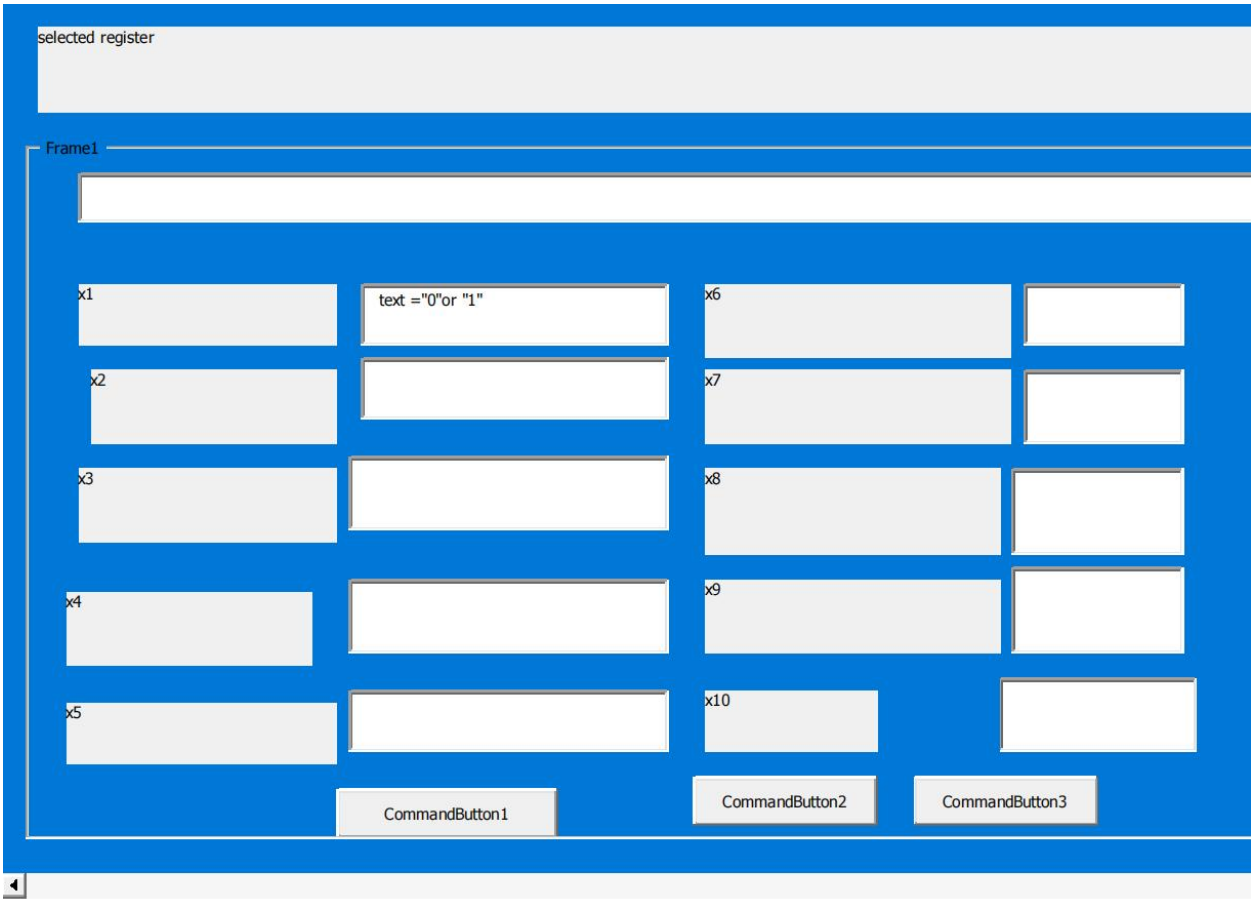
Letter and Laball switch USA ..
S ,switcy combination lock non lokkin, disconnect switch ,drum switch ,flow operated switch ,foot operated swit
mushroom head,pressure or vacut,operated switch,pushbuy or vacut, pushbuy swity,pushilluminates ,rotary swi
switch ,toggle switch transfer switch ,wobble stick , fuel contactor ,relay blowotbreak coil field ,commutating fiel
Connector,,
- Consol visual ,prodibus , can bopen ethernet commuyaty ,net pin 1, pin
Atex , installation

Command automatics

Installatt port ethernet ,port ethernet prise RJ45,led ,port com

Synopsis cabling system

Logigrame algorithm ,commutator.



```
Sub Macro1()
'
' Macro1 Macro
' visual basic atm program .sten object by system .event )hand
' "&chr(10)&"public class transaction box
' "&chr(10)&"const service as decimal =6.5
' "&chr(10)&"const pin as integer +9343
' "&chr(10)&"dim balance as decimal =150
' "&chr(10)&"private sub label 12_click (by sender System.object event arg handles labe
'
End Sub
Sub Macro2()
'
' Macro2 Macro
' type meter three phase ac static watt hous smart
' "&chr(10)&"metering algorith
' "&chr(10)&"accuracy  nomial voltage  mettering frequence metering const functionality current sensors energy pulse energy temper detection remote communication iec 62056 extrevm internal battery
'
    ActiveWindow.ActivePane.VerticalPercentScrolled = 205
    ActiveWindow.ActivePane.VerticalPercentScrolled = 146
    Selection.TypeText Text:= _
        "-------------------------------------------------------"
    Selection.TypeText Text:= _
        "-------------------------------------------------------"
    Selection.TypeText Text:="-------"
    Selection.TypeParagraph
    Selection.PasteAndFormat (wdFormatOriginalFormatting)
```

```
ActiveWindow.ActivePane.VerticalPercentScrolled = 146
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
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Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.Paste
ActiveDocument.Save
ActiveWindow.ActivePane.VerticalPercentScrolled = 207
```

```
    ActiveWindow.ActivePane.VerticalPercentScrolled = 202
    ActiveWindow.ActivePane.VerticalPercentScrolled = 197
    ActiveWindow.ActivePane.LargeScroll Down:=1
    ActiveWindow.ActivePane.VerticalPercentScrolled = -75
    ActiveWindow.ActivePane.VerticalPercentScrolled = -41
    Windows("Doc8 drawing tshingombe fiston").Activate
    Windows("Doc2 drawing tshingombe").Activate
    ActiveWindow.ActivePane.VerticalPercentScrolled = 127
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ChangeFileOpenDirectory "C:\Users\Library SIX\Desktop\"
    ActiveDocument.SaveAs2 FileName:="Doc1 tshing.docx", FileFormat:= _
        wdFormatXMLDocument, LockComments:=False, Password:="", AddToRecentFiles _
        :=True, WritePassword:="", ReadOnlyRecommended:=False, EmbedTrueTypeFonts _
        :=False, SaveNativePictureFormat:=False, SaveFormsData:=False, _
        SaveAsAOCELetter:=False, CompatibilityMode:=15
    ActiveWindow.Close
    Application.Quit
End Sub
Sub Macro3()
'
' Macro3 Macro
' register computer  select  pin input out put
' "&chr(10)&"binaire code adress x1,x2,x3,x4,x5,x6,x7,
'
    Application.Run MacroName:="frm1"
```

End Sub

Sub frm1()

'

' frm1 Macro

' if x1,x2,x3,x4 ,x5,x6,x7,x8,x9 then register else select ,,, end if select case x1 and select x2 and iteractive execute loop for each while the statemnt " if x1 then" x2 or" sub " block statemnt ,, arrays paraenthes declare , create consol mod

'

End Sub

```
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm12
   Caption         =   "UserForm12"
   ClientHeight    =   8736
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   19764
   OleObjectBlob   =   "UserForm computer x 1 tshingombe.frx":0000
   StartUpPosition =   1  'CenterOwner
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm12"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
```

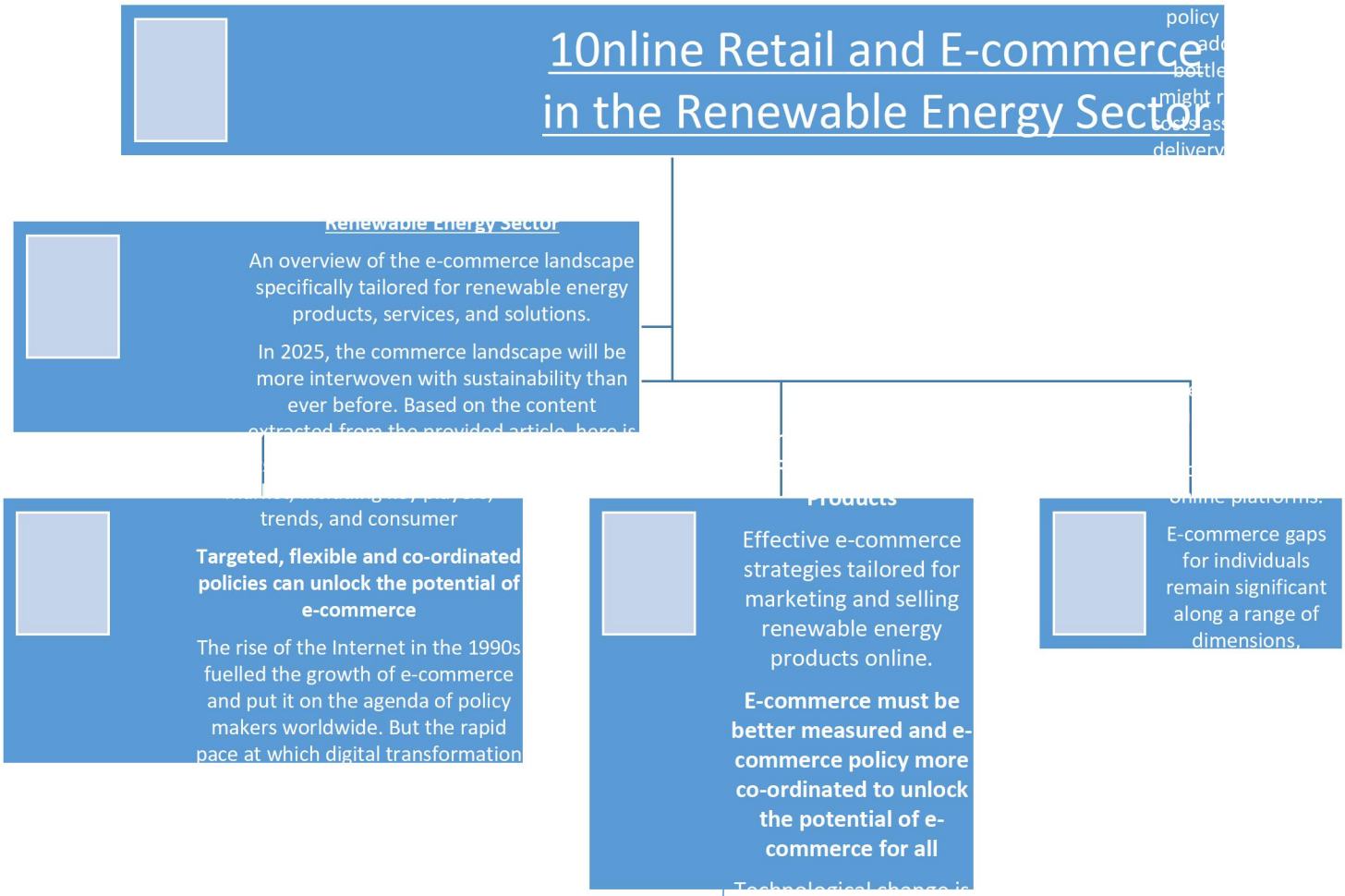
1 .12.15..1 topics :

1 AGI in Human-Machine Collaboration

Exploring how AGI can augment human capabilities and lead to new forms of collaboration.

Future Scenarios of AGI Development

Examining possible future scenarios



.1 Electric power B2B descriptions

The Business-to-Business (B2B) framework within the electric power industry stands as a unique and complex entity, markedly different from the more familiar terrain of consumer focused markets. This distinction is not merely in scale but also in the depth and intricacies of its operations. Predominantly characterized by transactions of substantial magnitude, the electric power B2B sector encompasses a vast array of activities. These range from the procurement of heavy duty equipment in bulk quantities to the formulation and execution of comprehensive contracts that oversee power generation, transmission, and distribution across vast geographical expanses.

2 Notations

In this section, we introduce and define the notations that will be used throughout the methodology. This notation serves as the foundation for understanding the data structures, user behaviors, and item attributes, as well as the collaborative filtering approach we use to recommend products to users.

U: Represents the set of all users in the system. Each user is uniquely identified by an index in this set, *N* represents the number of the users.

n: Represents the number of categories for individual product attributes.

m: Represents the number of categories for user behaviors.

S (*u, v*)*:* Represents the similarity between users *u* and *v*. This similarity metric is crucial for collaborative filtering, as it determines how similar two users are in terms of their preferences. The basic formula for collaborative filtering is given by Equation 1:

w_o, w_a, w_b: these are the weight ratios associated with order, following, and browsing data respectively. They determine the significance or influence of each type of implicit feedback in the recommendation process. For examples, we can set $w_o = 1$, $w_a = 0.5$, $w_b = 0.5$.

BI_u, NBI_u: these vectors are behavior numbers varying time, representing the bidding and non-bidding behaviors of user *u* respectively. They capture unique B2B behaviors that are essential for understanding

.5 Digital Marketing for Renewable Energy E-commerce

Best practices for digital marketing in promoting renewable energy products and services online Public policies can support the creation of innovative e-commerce business models

As digital transformation progresses, new business models will arise in ways that are difficult to predict, but which also challenge traditional policy frameworks. In particular, some regulatory barriers preserve artificial distinctions between online and offline commerce, even as firms increasingly pursue business models that combine both elements. Where local zoning laws prevent multi-purpose use of brick-and-mortar stores, or planning regulations

1.6. Sustainable Practices in E-commerce

driven solutions are revolutionizing retail operations by optimizing supply chain management and e-commerce processes. Ant colony optimization (ACO) algorithms play a crucial role in improving vehicle routing, enhancing delivery speed, reducing costs, and minimizing resource

Case Studies in Renewable Energy E-commerce:

3.3 Fusion of behavioral data

The fusion of behavioral data is a pivotal step in the methodology, aiming to create a comprehensive representation of user interactions on the platform. This section delves into the intricacies of how different types of behavioral data are combined to provide a holistic view of user preferences and activities.

3.3.1 Order, following, and browsing data

3.3.3 Bidding and non-bidding data

Unique to the B2B E-commerce landscape, bidding (BI_u) and non-bidding (NBI_u) data provide insights into the negotiation and decision-making processes of users. These behaviors, while not directly linked to transactions, offer valuable context about user intentions and preferences.

3.3.4 Behavior vectors

The behavior vectors for bidding and non-bidding data are formulated to capture the essence of these unique interactions. By characterizing user similarity through these vectors, we can better understand the

Fui = woOui + waAui + wbBui (2)

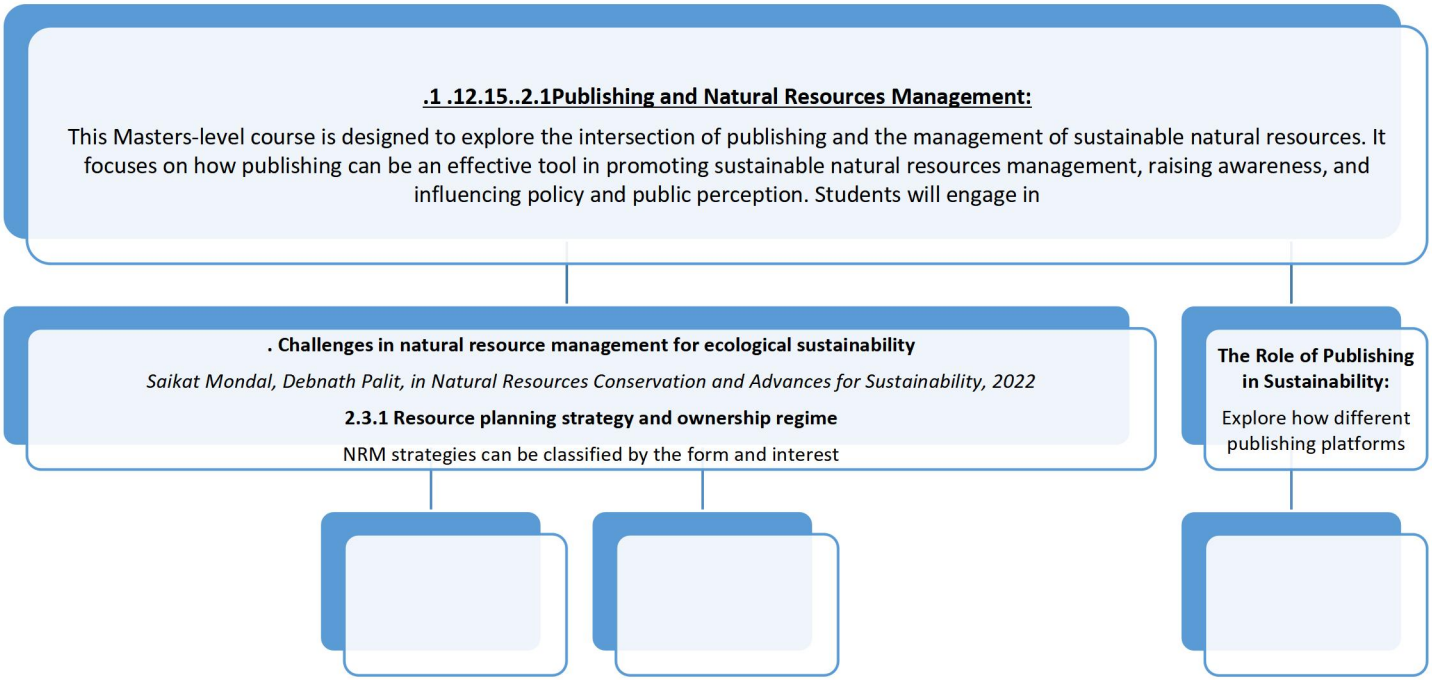
This formula ensures that each type of interaction contributes proportionally to the final fused representation based on its assigned weight. A cosine similarity measure is used here to characterize user similarity for the fusion of behaviors, as detailed in Equation 3.

Sf(u,v)=cos(θ)=Fu·Fv||Fu||||Fv|| (3)

For bidding and non-bidding data, we employ a cosine similarity measure to characterize user similarity $S_{bid}(u,$

User behavior matrix

With the item attribute vectors in place, we can then construct the user-attribute behavior matrix. Firstly, the overall user behavior vector $B_{m\times M}$ is established with each element representing the number of specific behavior (e.g., order number) for each item. The m is the number of behavior types and M is the number of items. Secondly, through matrix operations $B_{m\times M}lA_{M\times n}$, we can obtain the user specific-attribute interaction matrix $R_{m\times n}$. Finally, by summing up each column of the matrix, we can obtain a vector representing the behavioral performance of each user for each attribute. Therefore, the user-attribute behavior matrix $M_{N\times n}$ is established. Mapping user behaviors onto the item attribute vectors, we can capture the nuanced interactions between users and the multifaceted attributes of items.



2.4 Environmental Journalism and Communication

Learn the techniques and ethics of reporting on environmental issues, and how this impacts public awareness and policy-making.

2.5 Digital Publishing and New Media

Analyze the role of digital publishing and social media in shaping discussions and actions regarding sustainability.

2.6 Content Creation for Natural Resource Management

Discover practices for creating engaging content that effectively communicates the importance of sustainable natural resource management.

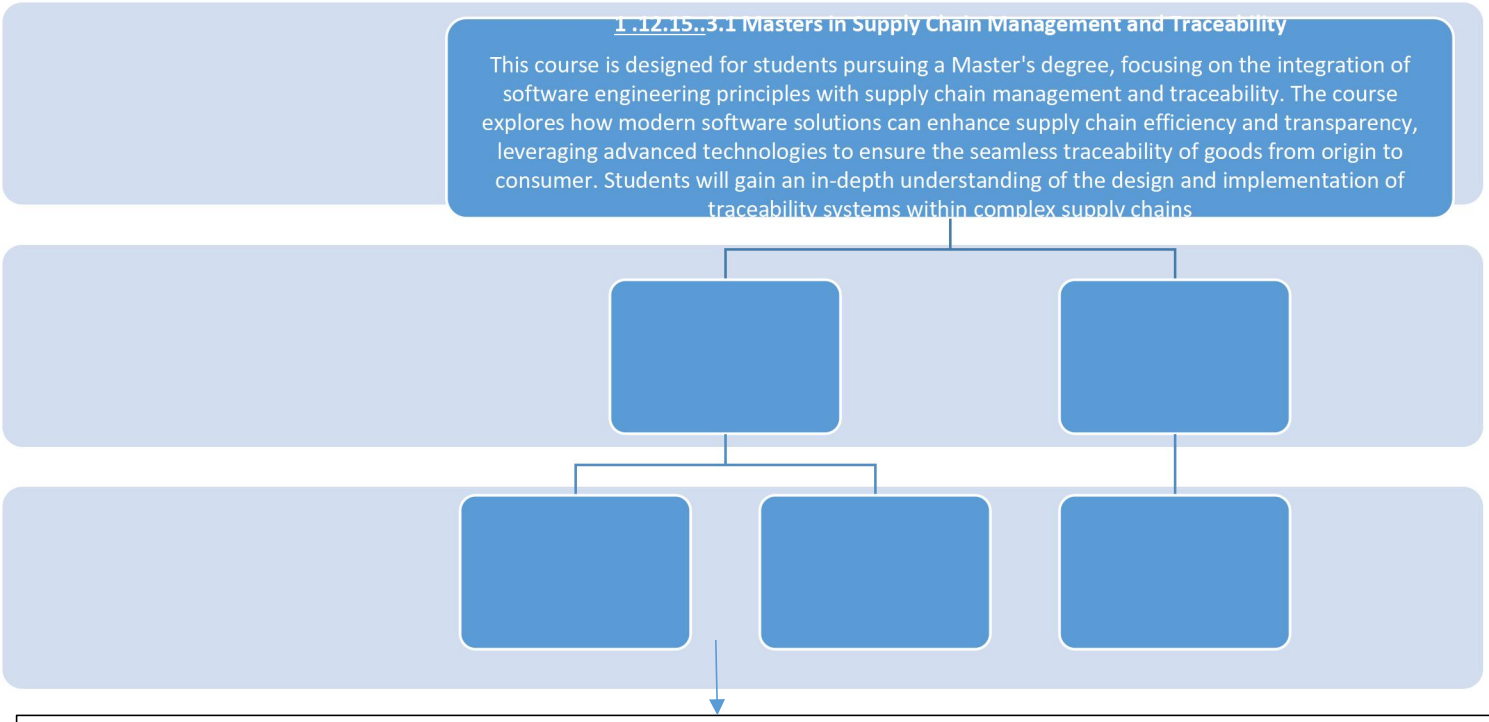
2.7 Policy Advocacy and Public Engagement: xploration. The platform further provides a weekly summary of SDG topics and progress that allow researchers to quickly scan through a collection of papers and determine their relevance. Cactus Communications is developing this technology further to support researchers, institutions, publishers and policymakers in recognizing SDG-relevant research.

Springer Nature has also released 17 SDG Content Hubs with the goal of connecting researchers addressing SDG challenges with policymakers and business practitioners. By enhancing the visibility of SDG publishing activities through the content hubs, they aim to connect the key communities needed to drive global progress.

The RELX SDG Resource Center is another example that aims to aid researchers and the public by giving them access to critical content that builds understanding about the SDGs. The resource center hosts multiple initiatives like annual events, podcasts, in-depth reports, SDG News Tracker (by LexisNexis Newsdesk) and key research published by Elsevier, all under one roof.

2.2. New journals on SDG-relevant topics

In recent years, many academic publishers have increasingly focused on issues related to sustainable development, aligning with global priorities of the SDGs. For example, PLOS has expanded their Open Access



.2 Introduction to Supply Chain Management

An overview of the basic concepts and components of supply chain management, focusing on the flow of goods, information, and finances.

he way in which companies have conducted, managed, controlled and integrated their

business operations have experienced dramatic changes during the last couple of years –

this is especially true in the worldwide recording and music industries. Rapid advances

in technology and increasing regulatory freedom have changed the rules of operation

and competition. Businesses are now competing globally and traditional barriers

between industries are breaking down. To cope with these and other changes and

achieve superior performance, business leaders are moving towards new business

paradigms that allow their companies to work more closely together with their

traditional and new business partners (which include all clients and suppliers up and

down the supply chain), in order to adapt to the rapidly changing marketplace.

As discussed in the fourth chapter under point 4.2, it is proposed by the mentioned

authors that this new collaboration can be successfully achieved by outsourcing all non-

core business activities to a third party business partner, which in turn will lead to an

improved integration through supply chain management. As companies focus on their

core activities and outsource the rest, their success increasingly depends on their ability

to control what happens in the value chain outside their own boundaries (Magretta

2000: 29 - 59). Supply chain leaders are thus reconsidering the linkages, not only

between functions within their own companies, but also with other An Introduction to Supply Chain Management

This free online course helps you manage your supply chain operations and processes successfully.

.1 .12.15..4.1 Social Media Marketing for Real Estate, Rental, and Leasing

This course is designed to equip students with the skills and knowledge required to effectively leverage social media platforms for the marketing of real estate, rental, and leasing businesses. Students will learn to create engaging content, manage social media campaigns, and analyze performance metrics specific to the real estate sector.: It sounds like you have a curriculum outline! Are you looking to develop more details for these sections

.1 Social Media Marketing for Real Estate, Rental, and Leasing

1. Creating Engaging Content
   - Techniques for capturing high-quality photos and videos of properties.
   - Writing compelling property descriptions and posts.
   - Utilizing virtual tours and 3D walkthroughs to enhance listings.
2. Managing Social Media Campaigns
   - Strategies for targeting the right audience on platforms like Facebook, Instagram, and LinkedIn.
   - Best practices for scheduling posts and maintaining consistency.
   - Leveraging paid advertising and promotions to boost visibility.
3. Analyzing Performance Metrics
   - Key performance indicators (KPIs) specific to real estate, such as engagement rate, click-through rate (CTR), and lead generation.
   - Tools and software for tracking and reporting metrics.
   - Case studies and real-world examples of successful social media campaigns in real estate.

4.2 Introduction to Social Media Marketing

1. Overview of Social Media Platforms
   - Introduction to major platforms: Facebook, Instagram, Twitter, LinkedIn, TikTok, etc.
   - Understanding the unique features and audiences of each platform.
2. Creating a Social Media Strategy
   - Setting goals and objectives for social media marketing.
   - Identifying target audiences and crafting buyer personas.
   - Developing a content calendar and scheduling posts.
3. Content Creation and Management
   - Types of content: images, videos, stories, live streams, etc.
   - Tools and apps for creating and editing social media content.
   - Best practices for engaging and interactive posts.
4. Analyzing and Optimizing Performance
   - Using analytics tools to measure success and ROI.
   - Understanding key metrics and how to interpret them.
   - Strategies for continuous improvement and staying up-to-date with trends.

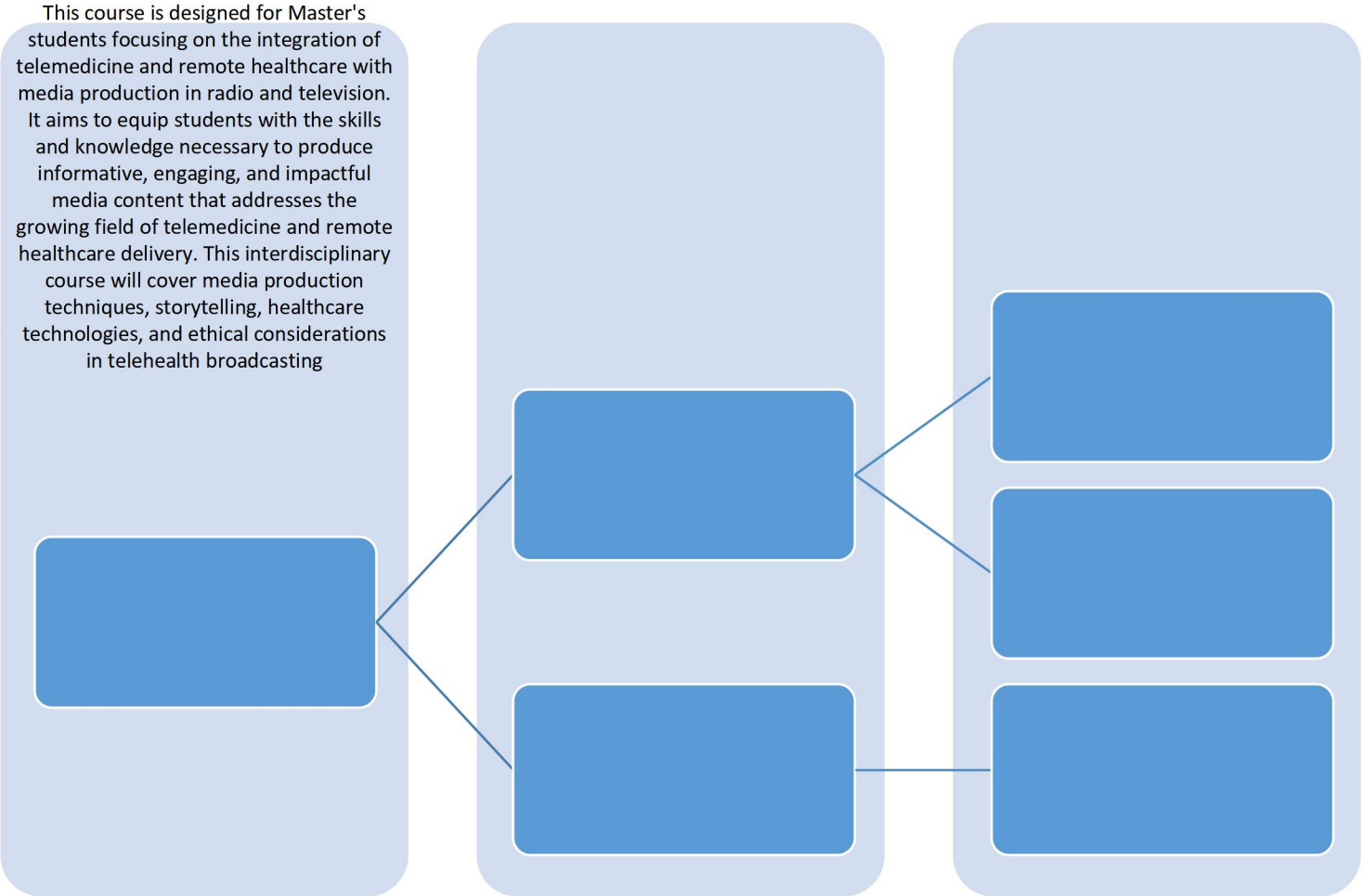
I hope these ideas help you build out your course! Let me know if you need any more assistance or specific details.

4.2 Introduction to Social Media Marketing

Understanding the basic concepts of social media marketing and its importance in the real estate, rental, and leasing sectors.: Understanding the Basic Concepts of Social Media Marketing

4.1 .12.13,,5.1 Advanced Telemedicine and Remote Healthcare Production

This course is designed for Master's students focusing on the integration of telemedicine and remote healthcare with media production in radio and television. It aims to equip students with the skills and knowledge necessary to produce informative, engaging, and impactful media content that addresses the growing field of telemedicine and remote healthcare delivery. This interdisciplinary course will cover media production techniques, storytelling, healthcare technologies, and ethical considerations in telehealth broadcasting



.2 Introduction to Telemedicine and Remote Healthcare: Advanced Telemedicine and Remote Healthcare Production

This course is tailored for Master's students who aim to integrate telemedicine and remote healthcare with media production in radio and television. The course equips students with the skills and knowledge to produce impactful media content in the rapidly growing field of telemedicine and remote healthcare delivery.

Key Topics:

1. Media Production Techniques
   - Basics of video and audio production.
   - Advanced editing techniques.
   - Production of live broadcasts and pre-recorded shows.
2. Storytelling for Healthcare
   - Crafting compelling stories around telehealth services.
   - Techniques for simplifying complex medical information for a general audience.
   - Use of patient testimonials and case studies.

Understanding the fundamentals of telemedicine, its history, current trends, and the potential impact on healthcare delivery.

5.3 Television and Radio Production Essentials:

Fundamental techniques in radio and television production including scriptwriting, audio/visual recording, editing, and broadcasting.: Healthcare Technologies

- Overview of telemedicine technologies: video conferencing tools, remote monitoring devices, and telehealth platforms.
- Integration of these technologies into media production.

Ethical Considerations in Telehealth Broadcasting

- Privacy and confidentiality in telemedicine.
- Ethical dilemmas in telehealth storytelling.
- Regulations and guidelines for telehealth content production.

.1 .12.15.6.1 Technical Writing for Technology

This course is designed to prepare students with the skills and knowledge necessary to effectively communicate complex technical information. Through a blend of theory and practical application, students will learn how to write manuals, guides, and reports in a way that is clear, concise, and accessible to various audiences within the technological fi

.2 Introduction to Technical Writing

An overview of technical writing, its significance in the tech industry, and the roles and responsibilities of a technical writer.: Key Topics:

1. **Fundamentals of Technical Writing**
    - Understanding the purpose and scope of technical writing.
    - Characteristics of effective technical documentation.
    - Writing for different audiences: experts, technicians, and laypersons.
2. **Writing Manuals and Guides**
    - Structure and components of user manuals and guides.
    - Techniques for breaking down complex processes into simple steps.
    - Use of diagrams, flowcharts, and other visual aid

6.3 Understanding Your Audience:

Learn how to identify and write for different audience levels, ensuring your writing is accessible and understood by your intended readers.:

reating Technical Reports

- Types of technical reports: feasibility reports, progress reports, and research reports.
- Organizing and structuring technical reports.
- Writing clear and concise executive summaries, conclusions, and recommendations.

Documenting Software and Hardware

- Writing API documentation and software user guides.
- Creating installation guides and troubleshooting manuals for hardware products.
- Techniques for ensuring accuracy and clarity in technical documentation.

Editing and Proofreading

- Best practices for editing and proofreading technical documents.
- Common errors and how to avoid them.
- Tools and software for technical editing and proofreading

6.4 Research and Information Gathering: **Primary Data Sources**

- **Interviews:** Conduct interviews with subject matter experts (SMEs), stakeholders, and users to gather firsthand information.
- **Surveys and Questionnaires:** Distribute surveys and questionnaires to collect data directly from your target audience

7topics :

4.1 .12.15.7.1.Masters in Vertical Farming and Urban Agriculture with Focus on Synthetic Biology

This course explores the intersection of vertical farming, urban agriculture, and synthetic biology, preparing students to implement urban farming systems that leverage synthetic biology for enhanced productivity and sustainability.

7.2Introduction to Vertical Farming and Urban Agriculture

An overview of vertical farming and urban agriculture, their roles in modern food production, and how they contribute how they contribute to sustainability.

Key Topics:

- **Definitions and Concepts:** Understanding what vertical farming and urban agriculture entail.
- **Historical Development:** Tracing the evolution of these farming techniques.
- **Sustainability Contributions:** How these methods reduce the carbon footprint and promote resource effi

7.3.Fundamentals of Synthetic Biology

Study the basic principles of synthetic biology, including DNA sequencing, genetic engineering, and how these tools are

Study the basic principles of synthetic biology, including DNA sequencing, genetic engineering, and how these tools are

Key Topics:

- **Introduction to Synthetic Biology:** Basic concepts and terminology.
- **DNA Sequencing and Genetic Engineering:** Techniques and applications.
- **Plant Optimization:** How synthetic biology enhances plant growth and resilience

7.4..Applications of Synthetic Biology in Urban Agriculture

Explore how synthetic biology is revolutionizing urban farming, including genetically modified organisms and engineere

7.6Design of Vertical Farming Systems

Learn the architectural and systems design principles for creating efficient vertical farms in urban environments.: Explo engineered biosystems that improve crop yield.

Key Topics:

- **GMOs in Urban Farming:** Benefits and challenges.

- **Engineered Biosystems:** Innovations that enhance productivity and sustainability.

- **Case Studies:** Examples of successful applications in urban agriculture.

7.7Integration of Biotechnology in Crop Production

Discuss the integration of biotechnology tools to enhance crop resilience, nutrient uptake, and pest resistance.: Explore

Key Topics:

- **Innovative Technologies:** Emerging tools and techniques.

- **Sustainability Goals:** Advancing towards more sustainable and resilient food systems.

- **Research and Development:** Ongoing projects and future research directions.

These courses will provide students with a comprehensive understanding of the intersection between vertical farming, production.

Feel free to ask if you need more details or specific information on any of these topics!

7.8.Environmental and Economic Impacts of Urban Agriculture

Evaluate the environmental and economic benefits and challenges posed by urban agriculture and vertical farming.

7.9.Regulatory and Ethical Considerations in Synthetic Biology

Examine the regulatory frameworks and ethical considerations associated with the use of synthetic biology in agricultu globally

7.10Future Trends in Vertical Farming and Synthetic Biology

Explore the potential future advancements in vertical farming technologies and synthetic biology app· · **Equity and Acc**

8..topic

4.1 .12.15..8.Master's in Urban Water Supply, Sewerage, Waste Management, and Remediation Activities

8.1. This course delves into the complexities of urban infrastructure related to water supply, sewerage, waste managen effective urban planning necessary to manage these essential services sustainably. The course equips graduates with th

sectors.

8.2.Introduction to Urban Water Supply Systems

Explore the components of urban water supply systems, including water sourcing, treatment, distribution, and quality m

Explore the components of urban water supply systems, including water sourcing, treatment, distribution, and quality m

Key Topics:

- **Water Sourcing:** Identifying and managing sources of water such as rivers, lakes, and groundwater.
- **Water Treatment:** Processes for purifying water to meet safety and quality standards.
- **Distribution Systems:** Designing and maintaining networks for efficient water delivery.
- **Quality Management:** Monitoring and ensuring the quality of water supplied to urban areas.

8.3 Sewerage Systems Design and Manage

8.3.Sewerage Systems Design and Management

Learn about the engineering, design, and operational management of urban sewerage systems, focusing on sustainable

Learn about the engineering, design, and operational management of urban sewerage systems, focusing on sustainable

Key Topics:

- **Engineering Principles:** Understanding the fundamentals of sewerage system design.
- **Sustainable Practices:** Implementing environmentally friendly waste treatment methods.
- **Resource Recovery:** Techniques for reclaiming and repurposing resources from was

8.4.Urban Waste Management Strategies

Understand the principles and methods of waste management in urban areas, addressing : Understand the principles a and liquid waste effectively.

Key Topics:

- **Waste Collection and Disposal:** Strategies for efficient waste collection, segregation, and disposal.
- **Recycling and Reuse:** Promoting recycling and reuse to minimize waste generation.

- **Waste Reduction:** Implementing programs and policies to reduce overall waste output.

8.5.Remediation Activities and Technologies

Explore different technologies and methodologies used in the remediation of contaminated sites, focusing on both che
into urban planning processes to create more sustainable and livable cities.

Key Topics:

- **Urban Planning Principles:** Incorporating water and waste considerations into urban design.
- **Interdisciplinary Approaches:** Collaborating with various stakeholders for holistic planning.
- **Sustainable Development Goals:** Aligning urban planning with global sustainability objectives.

These courses provide a comprehensive understanding of urban water supply, sewerage, waste management, and rem

If you need more details or have specific questions on any of these topics, feel free to let me know!

8.6.Policy and Regulation in Urban Water and Waste

Gain insights into the regulatory frameworks and policies that govern urban water and waste management. Explore ho
and waste management into urban planning processes to create more sustainable and livable cities.

Key Topics:

- **Urban Planning Principles:** Incorporating water and waste considerations into urban design.
- **Interdisciplinary Approaches:** Collaborating with various stakeholders for holistic planning.
- **Sustainable Development Goals:** Aligning urban planning with global sustainability objectives.

These courses provide a comprehensive understanding of urban water supply, sewerage, waste management, and rem

If you need more details or have specific questions on any of these topics, feel free to let me know!

8.7.Climate Change and its Impact on Water and Waste Management

Examine how climate change affects urban water and waste systems and explore adaptive strategies to enhance resilie

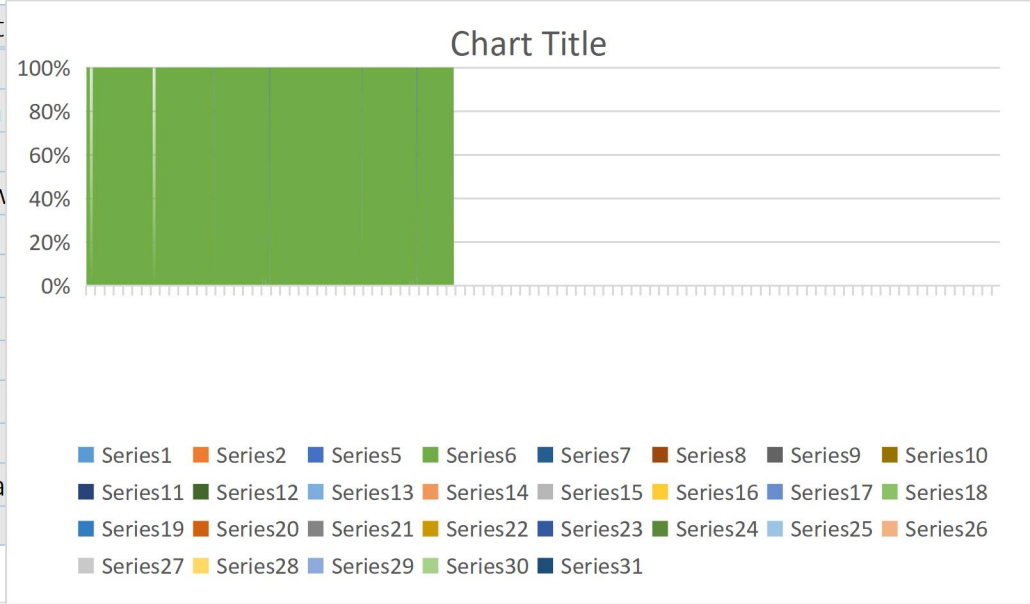
8.8..Sustainable Innovations in Water and Waste Systems

Discover emerging technologies and innovative practices for enhancing sustainability in urban water and waste manage
emerging technologies and innovative practices. Here are some cutting-edge innovations:

Emerging Technologies:

1. **Smart Water Management Systems**
   - Utilize IoT sensors and real-time data analytics to monitor water quality, detect leaks, and optim
   - Implement smart meters to provide accurate water consumption data and encourage conservat
2. **Advanced Water Treatment Technologies**
   - Adopt membrane filtration, advanced oxidation processes, and nanotechnology to enhance wat
1. Use desalination technologies to convert seawater into **aste-to-Energy Technologies**
   - Convert organic waste into biogas through anaerobic digestion, reducing landfill waste and gene
   - Implement gasification and pyrolysis to transform solid waste into syngas and biochar.
2. **Decentralized Wastewater Treatment**
   - Develop decentralized systems that treat wastewater close to the source, reducing the need for
   - Use constructed wetlands and natural treatment systems for cost-effective and sustainable was

3. **Green Infrast**
   - Integrate green
   - Employ urban w



Innovative Practices:

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1. 8.9Integrating Water a

- Adopt integrated planning frameworks that consider water and waste systems as interconnecte
- Use spatial planning tools to optimize the placement of water and waste facilities, minimizing er

2. **Sustainable Development Goals (SDGs)**
    - Align urban planning efforts with the United Nations Sustainable Development Goals, particularl
    - Promote sustainable land use practices that protect water resources and reduce waste generati
3. **Interdisciplinary Collaboration**
    - Foster collaboration among urban planners, engineers, environmental scientists, and policymak
    - Engage stakeholders, including local communities, businesses, and NGOs, in the planning proces
4. **Climate Resilience and Adaptation**
    - Incorporate climate resilience measures into urban planning to address the impacts of climate c
    - Develop adaptive strategies to manage extreme weather events, such as floods and droughts, a
5. **Green and Blue Infrastructure Integration**
    - Integrate green infrastructure (e.g., parks, green roofs) and blue infrastructure (e.g., rivers, lake
    - Design urban spaces that promote natural water infiltration, reduce runoff, and support biodive
6. **Data-Driven Decision Making**
    - Utilize Geographic Information Systems (GIS), remote sensing, and data analytics to inform plan
    - Implement smart city technologies to enhance the management and operation of water and wa

By adopting these strategies and embracing innovative technologies, urban planners can create more sustainable, resil

If you have any specific questions or need more detailed information on any of these topics, feel free to ask!

Learn how to effectively integrate water supply, sewerage, and waste management into urban planning processes to cr

9.topic

4.1 .12.15..9.1.Transportation and Warehousing in Tourism Planning and Development

This course offers a comprehensive study into how transportation and warehousing play a crucial role in tourism plann optimize tourism supply chains, improve accessibility, and enhance the overall tourist experience. This course provides development.

9.2..Introduction to Tourism Logistics

Explores the fundamental principles of logistics management within the tourism sector, emphasizing its role in seamles

- **Air Travel:** Managing airport logistics, flight scheduling, and passenger services.
- **Rail and Road Transport:** Coordinating bus and rail services for tourists, ensuring efficient transit systems
- **Maritime Travel:** Organizing ferry and cruise services, port management.

· **Warehousing Solutions**

- **Storage Facilities:** Designing and managing warehouses for tourism-related goods.
- **Inventory Management:** Techniques for maintaining op

9.3…Transportation Infrastructure in Tourism

Examines the various transportation infrastructures such as airports, seaports, and road networks that support the tou

- **Regulatory Compliance:** Understanding laws and regulations affecting transportation and warehousing in
- **Sustainability Policies:** Implementing eco-friendly practices to minimize environmental impact.

9.4..Role of Warehousing in Tourism

Discusses how warehousing and inventory management contribute to the efficiency of tourism operations. **ogistics and**

- **Supply Chain Management:** Strategies for efficient coordination of suppliers, transporters, and retailers.
- **Infrastructure Development:** Planning and constructing facilities to support tourism activities.
- **Technology Integration:** Using digital tools for tracking, scheduling, and management.

9.5..Sustainable Transport Solutions

Covers sustainable practices and innovations in transportation that minimize environmental impact and promote eco-f

- **Barrier-Free Travel:** Designing inclusive transportation systems for travelers with disabilities.
- **Connectivity Enhancement:** Ensuring seamless transitions between different modes of transport.

9.6..Tourism Supply Chain Management

Analyzes the intricacies of supply chain management specifically in the tourism sector, including challenges and best pr

- **Definition and Scope:** Understanding what tourism logistics encompasses.
- **Key Components:** Identifying the main elements of tourism logistics, such as transportation, warehousing

· **Role in Seamless Travel Experiences**

- **Customer Satisfaction:** Ensuring tourists have smooth and enjoyable experiences from arrival to departu
- **Efficiency and Reliability:** Improving the efficiency and reliability of travel services through effective logist

9.7.Policy and Regulations in Tourism Transport

Explores the regulations and policies affecting transportation and warehousing, and how they influence tourism develo

- **Seasonal Demand:** Managing fluctuations in demand due to tourist seasons.
- **Coordination Complexity:** Overcoming challenges in coordinating multiple service providers and stakehol

· **Technological Advancements**

- **Digital Solutions:** Utilizing technology to streamline logistics processes, such as online booking systems a
- **Data Analytics:** Leveraging data to predict trends, optimize routes, and improve service delivery.

9.8.Innovations in Tourism Warehousing

Investigates recent technological advancements in warehousing that support tourism industry needs. 9.8 Innovations i

This section investigates recent technological advancements in warehousing that support the tourism industry's needs.

Technological Advancements:

1. **Smart Warehousing:** Automation and AI-driven inventory management systems optimize workflows an

9.9..Case Studies on Tourism and Logistics

Presents case studies highlighting logistics success and challenges in various tourism destinations. his section presents

Case Studies:

1. **Public Policy Co-Creation in Recife:** Examines the creative tourism plan development process in Recife,

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10.topics

4.1 .12.15.10.1..Spatial Computing in Telecommunications

This course explores the integration of spatial computing technologies within the telecommunications sector. Students
and innovate telecommunications solutions. Covering foundational concepts to advanced applications, the course is de

10.2..Introduction to Spatial Computing

This topic covers the basics of spatial computing, its historical evolution, and its current importance across various indu

1. **Foundational Concepts**
   - **Spatial Data:** Understanding the types of spatial data, including geographic information systems
   - **Spatial Computing Principles:** Basic principles of spatial computing, including spatial analysis, da
2. **Network Efficiencies**
   - **Optimizing Network Design:** Utilizing spatial data to design more efficient and reliable telecomm

10.3..Spatial Data and Telecommunications

An exploration of the types and sources of spatial data utilized in telecommunications, as well as methods for data c

Resource Allocation: Applying spatial analysis to optimize the allocation of network resources and infrastru

· Service Delivery Improvements

Location-Based Services: Enhancing service delivery through the integration of location-based services and personali

Coverage Mapping: Using spatial data to identify coverage gaps and optimize network coverage.

10.4..Geographical Information Systems (GIS) in Telecom

This topic discusses the application of GIS technologies for network planning, resource optimization, and service provis

- **Smart Cities:** Leveraging spatial computing to develop smart city solutions that integrate telecommunicat
- **Augmented Reality (AR) and Virtual Reality (VR):** Exploring the applications of AR and VR in telecommuni

10.5..Network Planning and Optimization Using Spatial Computing

Strategies for using spatial computing to optimize telecom network deployments and enhancements through simulatio

10.6.Spatial Data Analytics for Telecom

An examination of analytic techniques and algorithms that leverage spatial data to provide insights and performance in

- **5G and Beyond:** Investigating the role of spatial computing in the deployment and optimization of 5G ne
- **Predictive Analytics:** Using spatial data for predictive analytics to anticipate network demands and preve

10.7..Augmented Reality (AR) in Telecommunication Services

Understanding the role of AR technologies in enhancing customer experiences and operational efficiencies within telec across various industries, with a particular focus on telecommunications.

Key Topics:

1. **Basics of Spatial Computing**
   - **Definition and Scope:** Understanding what spatial computing entails and its applications.
   - **Key Components:** Identifying the main elements of spatial computing, such as spatial data, geos
2. **Historical Evolution**
   - **Early Developments:** Tracing the origins of spatial computing from early cartography and geogra

- **Technological Advancements:** Highlighting key technological advancements that have shaped th

10.11..5G and Spatial Computing

1. Investigating how 5G technology benefits from spatial computing, including precise location services ar

- **Cross-Industry Applications:** Exploring how spatial computing is used in various industries, includ

- **Focus on Telecommunications:** Examining the specific applications of spatial computing in teleco

These courses provide students with a comprehensive understanding of spatial computing and its transformative impa

If you have any specific questions or need more details on a

10.12..Privacy and Security in Spatial Telecommunications

A look into the potential security and privacy challenges posed by spatial data in telecommunications and strate,

Key Challenges:

1. **Data Privacy Concerns**: The extensive collection and transmission of spatial data can lead to unauthoriz

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11..topics

4.1 .12.15..11.1..Advanced Legal Studies in Public Administration and Safety

This course is designed for Master's level students pursuing a degree in Public Administration and Safety with a focus o principles that underpin public administration and safety mechanisms. The course covers a range of topics, from consti navigate the complex legal landscape within the public sector.

11.2Introduction to Public Law

An overview of the principles and functions of public law, including constitutional and administrative law, which regulat

An overview of the principles and functions of public law, including constitutional and administrative law, which regulat

Key Topics:

- **Principles of Public Law:** Understanding the foundational concepts of public law.

- **Constitutional Law:** Examining the structure and functions of the constitution in regulating state authorit

- **Administrative Law:** Exploring the rules that govern the actions of administrative agencies.

11.3.Constitutional Law and Governance

Exploration of constitutional principles and how they guide governance and the formation of public policies. Exploratio

Key Topics:

- **Constitutional Principles:** Understanding fundamental principles like the rule of law, separation of power
- **Governance:** Analyzing how constitutional principles influence the design and functioning of government
- **Public Policy Formation:** Examining the role of constitutional law in shaping public policies.

11.4.Administrative Law

Understanding the rules and regulations that govern the activities of administrative agencies of government. Understar

Key Topics:

- **Administrative Agencies:** Exploring the creation, powers, and functions of administrative agencies.
- **Regulatory Frameworks:** Understanding the legal frameworks that regulate administrative actions.
- **Judicial Review:** Examining the mechanisms for reviewing administrative decisions

11.5.Legal Frameworks for Public Safety

Examination of the legal structures and policies designed to protect public safety and maintain order.

11.6..Ethics in Public Administration

Study of ethical principles and how they apply to decision-making processes in public administration. Examination of th

Key Topics:

- **Public Safety Laws:** Analyzing laws and regulations aimed at protecting public safety.
- **Policy Development:** Understanding the process of developing and implementing public safety policies.
- **Enforcement Mechanisms:** Exploring the role of law enforcement agencies in maintaining public order.

11.7..Public Policy and Legal Implications

Analysis of the intersection of law and public policy and the impact of legal frameworks on policy formation. Study of et

Key Topics:

- **Ethical Theories:** Understanding various ethical theories and their application in public administration.
- **Decision-Making:** Examining ethical considerations in decision-making processes.
- **Accountability:** Exploring mechanisms for ensuring ethical conduct and accountability in public administr

Analysis of the intersection of law and public policy and the impact of legal frameworks on policy formation.

Key Topics:

- **Law and Policy:** Understanding the relationship between legal frameworks and public policy.
- **Policy Analysis:** Examining the legal implications of policy decisions.
- **Case Studies:** Analyzing real-world examples of law influencing public policy

11.8..Human Rights and Social Justice

Understanding the role of law in promoting human rights and social justice in public administration. Understanding the

Key Topics:

- **Human Rights Law:** Exploring international and domestic human rights frameworks.
- **Social Justice:** Examining the role of law in addressing social inequalities and promoting justice.
- **Advocacy:** Understanding the

11.9.Crisis Management and Legal Compliance

Strategies for managing crises in public administration while ensuring compliance with legal standards. Strategies for m

Key Topics:

- **Crisis Management:** Developing strategies for effectively managing crises in public administration.

- **Legal Compliance:** Ensuring adherence to legal frameworks during crisis situations.

- **Contingency Planning:** Creating plans for maintaining public safety and order during emergencies.

These courses provide students with a comprehensive understanding of the legal aspects of public administration and s

If you have any specific questions or need more details on any of these topics, feel free t

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12.topic

4.1 .12.15..12.1Metallurgy in Oil and Gas Production, Refining, and Transport

This course provides an in-depth understanding of the metallurgical principles and practices specific to the oil and gas i
industry, focusing on their application in production, refining, and transport operations. The course aims to develop a c

12.2..Introduction to Metallurgy in Oil and Gas

An overview of the role of metallurgy in the oil and gas industry, discussing the importance of material selection and ar

his course provides an in-depth understanding of the metallurgical principles and practices specific to the oil and gas in
industry, focusing on their application in production, refining, and transport operations. The course aims to develop a c

12.3..Material Selection for Oil and Gas Production

Examines criteria for selecting materials, focusing on mechanical properties and corrosion resistance required in produ

An overview of the role of metallurgy in the oil and gas industry, discussing the importance of material selection and ar

Key Topics:

- **Role of Metallurgy:** Understanding the critical importance of metallurgy in oil and gas operations.

- **Material Selection:** Factors influencing the selection of materials for different segments of the industry.

- **Common Challenges:** Identifying and addressing common metallurgical issues, such as corrosion and mat

12.4..Corrosion Mechanisms and Prevention

Explores common corrosion mechanisms in oil and gas environments, such as sulfide stress cracking and chloride stress
mechanical properties and corrosion resistance required in production environments.

Key Topics:

- **Mechanical Properties:** Evaluating the strength, toughness, and durability of materials.
- **Corrosion Resistance:** Understanding the importance of corrosion resistance in harsh environments.
- **Material Criteria:** Criteria for selecting suitable materials for production equipment and infrastructure.

12.5..Metallurgical Processes in Refining

Discusses how metallurgical processes like heat treatment and welding are utilized in refining operations to enhance m

Explores common corrosion mechanisms in oil and gas environments, such as sulfide stress cracking and chloride stress

Key Topics:

- **Corrosion Mechanisms:** Understanding different types of corrosion and their causes.
- **Sulfide Stress Cracking:** Examining how sulfide stress cracking occurs and how to prevent it.
- **Chloride Stress Corrosion:** Exploring the effects of chloride stress corrosion and prevention methods.

12.6..Pipeline Materials and Design

Addresses the materials and design considerations for constructing oil and gas pipelines, including the assessment of fa
utilized in refining operations to enhance material properties.

Key Topics:

- **Heat Treatment:** Techniques for enhancing the mechanical properties of metals through heat treatment.
- **Welding:** Best practices for welding in refining operations.
- **Material Enhancement:** Methods for improving the performance and longevity of materials used in refini

12.7.Advanced Coatings and Surface Treatments

Focuses on the application of advanced coatings and surface treatments to protect metals used in oil and gas industry
assessment of failure modes and maintenance practices.

Key Topics:

- **Material Selection for Pipelines:** Criteria for selecting materials for pipeline construction.

- **Pipeline Design:** Principles of pipeline design to ensure safety and reliability.

- **Failure Modes:** Identifying common failure modes and strategies for prevention.

- **Maintenance Practices:** Best practices for maintaining pipeline integrity

Advanced Coatings and Surface Treatments

Focuses on the application of advanced coatings and surface treatments to protect metals used in oil and gas industry

Key Topics:

- **Coating Technologies:** Exploring different types of coatings and their applications.

- **Surface Treatments:** Techniques for treating metal surfaces to enhance durability and resistance to corro

- **Protective Measures:** Implementing protective measures to extend the lifespan of equipment.

12.8.Environmental Impact and Sustainability in Metallurgy

Evaluates the environmental impact of metallurgical practices in the oil and gas industry and explores sustainable pract
explores sustainable practices and innovations.

Key Topics:

- **Environmental Impact:** Assessing the environmental consequences of metallurgical activities.

- **Sustainable Practices:** Implementing eco-friendly practices in metallurgy.

- **Innovations:** Exploring technological innovations for reducing environmental imp

12.9..Failure Analysis and Case Studies

Explores methods for conducting failure analysis on metallurgical components and reviews real-world case studies. Eva
practices and innovations.

Key Topics:

- **Environmental Impact:** Assessing the environmental consequences of metallurgical activities.

- **Sustainable Practices:** Implementing eco-friendly practices in metallurgy.

- **Innovations:** Exploring technological innovations for reducing environmental imp

Explores methods for conducting failure analysis on metallurgical components and reviews real-world case studies.

Key Topics:

- **Failure Analysis Techniques:** Methods for analyzing and diagnosing material failures.
- **Case Studies:** Reviewing real-world examples of metallurgical failures and the lessons learned.
- **Preventive Measures:** Developing strategies to prevent future failur

12.10Future Trends in Metallurgy for Oil and Gas

Discusses emerging trends and technological advancements in metallurgy that could shape the future of the oil and gas
the oil and gas industry.

Key Topics:

- **Emerging Technologies:** Exploring new technologies and their potential impact on metallurgy.
- **Industry Trends:** Identifying trends that are likely to influence the future of metallurgy in the oil and gas s
- **Research and Development:** Current and future research initiatives aimed at advancing metallurgical pra

These courses provide a comprehensive understanding of metallurgical principles and practices tailored to the oil and g
field.

If you need more details or specific information on any of these topics, feel fr

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13.Topics:

4.1 .12.15..13.1.Integrated Water Management in Mining

This course provides an in-depth analysis of integrated water management practices within the mining industry. It cove
and societal needs. The course examines technological advances, regulatory frameworks, and case studies, aimed at ec

13.2.Introduction to Mining Water Management

Overview of water use in mining operations, including extraction, processing, and remediation. Discusses the significan

13.2.Water Resource Evaluation and Planning

Methods for evaluating water resources at mining sites, including hydrological assessments and water balance studies.

13.3.Water Quality Management in Mining

Techniques for monitoring and managing water quality in mining contexts, including treatment technologies and pollut

13.4.Regulatory and Environmental Compliance

An overview of legal frameworks and environmental regulations affecting water use in mining. Discusses compliance st

13.5.Innovation and Technology in Water Management

Examination of advanced technologies and innovative approaches in water management, such as desalination, water re

13.6.Stakeholder Engagement and Social License

The importance of engaging with stakeholders and communities regarding water management in mining. Covers strate

13.7..Climate Change Impacts on Water Resources

Analyzes the effects of climate change on water availability and management in mining operations. Discusses adaptatio

13.8.Case Studies and Best Practices

Review of real-world examples of successful water management in mining operations. Discusses lessons learned and be

13.7.Future Trends in Mining Water Management

Explores anticipated future developments in water management technologies and policies in mining.

3.1 Integrated Water Management in Mining

This course provides an in-depth analysis of integrated water management practices within the mining industry. It cove
and societal needs. The course examines technological advances, regulatory frameworks, and case studies, aimed at ec

13.2 Introduction to Mining Water Management

Overview of water use in mining operations, including extraction, processing, and remediation. Discusses the significan

Key Topics:

- **Water Use in Mining:** Understanding the various stages of water use in mining operations, from extractio
- **Integrated Water Management:** The importance of a holistic approach to managing water resources sust
- **Significance in Sustainable Mining:** How integrated water management contributes to sustainable mining

13.3 Water Resource Evaluation and Planning

Methods for evaluating water resources at mining sites, including hydrological assessments and water balance studies.

Key Topics:

- **Hydrological Assessments:** Techniques for assessing the availability and quality of water resources at min
- **Water Balance Studies:** Understanding the inputs and outputs of water within mining operations.
- **Planning Frameworks:** Developing comprehensive plans for sustainable water management.

13.4 Water Quality Management in Mining

Techniques for monitoring and managing water quality in mining contexts, including treatment technologies and pollut

Key Topics:

- **Water Quality Monitoring:** Methods for regularly assessing water quality.
- **Treatment Technologies:** Exploring technologies for treating contaminated water in mining operations.
- **Pollution Control:** Strategies for preventing and controlling pollution in mining environments.

13.5 Regulatory and Environmental Compliance

An overview of legal frameworks and environmental regulations affecting water use in mining. Discusses compliance st

Key Topics:

- **Legal Frameworks:** Understanding the regulations governing water use in mining.
- **Environmental Compliance:** Ensuring mining operations adhere to environmental standards.
- **Reporting Requirements:** Developing strategies for meeting regulatory reporting obligations.

13.6 Innovation and Technology in Water Management

Examination of advanced technologies and innovative approaches in water management, such as desalination, water re

Key Topics:

- **Desalination:** Using desalination technology to provide fresh water for mining operations.
- **Water Recycling:** Implementing recycling systems to reduce water consumption.
- **Smart Water Systems:** Leveraging digital technologies to optimize water management.

13.7 Stakeholder Engagement and Social License

The importance of engaging with stakeholders and communities regarding water management in mining. Covers strate

Key Topics:

- **Stakeholder Engagement:** Techniques for effectively engaging with stakeholders.

- **Community Involvement:** Involving local communities in water management decisions.

- **Social License to Operate:** Building and maintaining trust with stakeholders.

13.8 Climate Change Impacts on Water Resources

Analyzes the effects of climate change on water availability and management in mining operations. Discusses adaptatic

Key Topics:

- **Climate Change Effects:** Understanding how climate change impacts water resources in mining.

- **Adaptation Strategies:** Developing strategies to adapt to changing water availability.

- **Risk Minimization:** Implementing measures to minimize risks associated with climate change.

13.9 Case Studies and Best Practices

Review of real-world examples of successful water management in mining operations. Discusses lessons learned and be

Key Topics:

- **Successful Case Studies:** Examining examples of effective water management in mining.

- **Lessons Learned:** Identifying key takeaways from real-world cases.

- **Best Practices:** Establishing best practices for water management in mining.

13.10 Future Trends in Mining Water Management

Explores anticipated future developments in water management technologies and policies in mining.

Key Topics:

- **Emerging Technologies:** Investigating new technologies for water management.

- **Policy Developments:** Understanding how policies may evolve to support sustainable water management

- **Future Directions:** Exploring potential future trends in water management for mining.

These courses provide a comprehensive understanding of integrated water management in the mining industry, equipp

If you need more details or specific information on any of these topics, feel free to ask!

14.topic

.4.1 .12.15.14.Integrated Water Management in Mining

This course provides an in-depth analysis of integrated water management practices within the mining industry. It cove
and societal needs. The course examines technological advances, regulatory frameworks, and case studies, aimed at ec

14.1.Introduction to Mining Water Management

Overview of water use in mining operations, including extraction, processing, and remediation. Discusses the significan

14.2.Water Resource Evaluation and Planning

Methods for evaluating water resources at mining sites, including hydrological assessments and water balance studies.

14.3Water Quality Management in Mining

Techniques for monitoring and managing water quality in mining contexts, including treatment technologies and pollut

14.4.Regulatory and Environmental Compliance

An overview of legal frameworks and environmental regulations affecting water use in mining. Discusses compliance st

14.5.Innovation and Technology in Water Management

Examination of advanced technologies and innovative approaches in water management, such as desalination, water re

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and societal needs. The course examines technological advances, regulatory frameworks, and case studies, aimed at ec

14.1 Introduction to Mining Water Management

Overview of water use in mining operations, including extraction, processing, and remediation. Discusses the significan

Key Topics:

- **Water Use in Mining:** Understanding the various stages of water use in mining operations, from extractio

- **Integrated Water Management:** The importance of a holistic approach to managing water resources sust

- **Significance in Sustainable Mining:** How integrated water management contributes to sustainable mining

14.2 Water Resource Evaluation and Planning

Methods for evaluating water resources at mining sites, including hydrological assessments and water balance studies.

Key Topics:

- **Hydrological Assessments:** Techniques for assessing the availability and quality of water resources at min

- **Water Balance Studies:** Understanding the inputs and outputs of water within mining operations.

- **Planning Frameworks:** Developing comprehensive plans for sustainable water management.

14.3 Water Quality Management in Mining

Techniques for monitoring and managing water quality in mining contexts, including treatment technologies and pollut

Key Topics:

- **Water Quality Monitoring:** Methods for regularly assessing water quality.

- **Treatment Technologies:** Exploring technologies for treating contaminated water in mining operations.

- **Pollution Control:** Strategies for preventing and controlling pollution in mining environments.

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- **Future Directions:** Exploring potential future trends in water management for mining.

These courses provide a comprehensive understanding of integrated water management in the mining industry, equipp

If you need more details or specific information on any of these topics, feel free to ask!

15.topics

4.1 .12.15..15.1.Advanced Manufacturing Techniques in Genetic Engineering

This course explores the convergence of manufacturing processes and genetic engineering advancements, focusing on into techniques used to enhance manufacturing processes in biotechnology and genetic engineering fields.

15.2.Introduction to Genetic Engineering

Provides a foundational understanding of genetic engineering principles, techniques, and its application in various field

15.3..Manufacturing Processes in Biotechnology

Covers traditional and innovative manufacturing processes used in biotechnology, essential for producing genetically m

15.4..CRISPR and Advanced Genetic Modification Techniques

An in-depth look at cutting-edge genetic modification techniques such as CRISPR, which are revolutionizing genetic eng

15.5.Ethical and Regulatory Considerations

Discusses the ethical dilemmas and regulatory framework governing genetic engineering and manufacturing processes

15.6.Biopharmaceutical Manufacturing

Explores the manufacturing techniques specific to biopharmaceuticals produced through genetic engineering.

15.7.Fermentation Technology

Focuses on fermentation processes used in manufacturing biologically engineered products.

15.8..Scale-Up and Commercialization

Discusses the challenges and strategies involved in scaling genetic engineering products from laboratory to market.

15.9.Quality Control in Genetically Engineered Products

Examines the quality control methodologies specific to genetic engineering industries.

15.10.Future Trends in Genetic Engineering Manufacturing

Looks ahead at emerging trends and technologies that are poised to influence the genetic engineering and manufactur

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Looks ahead at emerging trends and technologies that are poised to influence the genetic engineering and manufactur

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16.topics

4.1 .12.15.16.1.Data Processing and Hosting Services in Computer Engineering

This course is designed for graduate students pursuing a Master's degree in Computer Engineering with a focus on data

and processing vast amounts of data, and the technological infrastructure in hosting services necessary to support such

16.2.Introduction to Data Processing

An overview of data processing concepts including data collection, cleaning, transformation, and storage.

16.3.Cloud Hosting Services

Understanding cloud hosting fundamentals including types of cloud services, deployment models, and scalability.

16.4..Big Data Technologies

Exploring the tools and technologies used for processing and managing big data such as Hadoop and Spark.

16.5Data Security in Cloud Hosting

An in-depth look into data security practices in cloud hosting environments, including encryption and access managem

16.6.Containerization and Microservices

Understanding containerization technologies like Docker and Kubernetes and their role in hosting services.

16.7Distributed Systems

Study of distributed computing systems architecture, design, and management.

16.8.Data Warehousing and Analytics

Techniques and tools used to design data warehouses and leverage analytics for business intelligence.

16.9..Serverless Computing

Exploration of serverless computing models and their application in data hosting services.

4.1 .12.15..16.1 Data Processing and Hosting Services in Computer Engineering

This course is designed for graduate students pursuing a Master's degree in Computer Engineering with a focus on data
and processing vast amounts of data, and the technological infrastructure in hosting services necessary to support such

16.2 Introduction to Data Processing

An overview of data processing concepts including data collection, cleaning, transformation, and storage.

Key Topics:

- **Data Collection:** Methods and tools for gathering data from various sources.
- **Data Cleaning:** Techniques for identifying and correcting errors in data sets.
- **Data Transformation:** Processes for converting data into a usable format.

- **Data Storage:** Solutions for storing large volumes of data efficiently.

16.3 Cloud Hosting Services

Understanding cloud hosting fundamentals including types of cloud services, deployment models, and scalability.

Key Topics:

- **Types of Cloud Services:** Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a
- **Deployment Models:** Public cloud, private cloud, and hybrid cloud.
- **Scalability:** Techniques for scaling cloud resources to meet demand.

16.4 Big Data Technologies

Exploring the tools and technologies used for processing and managing big data such as Hadoop and Spark.

Key Topics:

- **Hadoop:** Overview of the Hadoop ecosystem and its components.
- **Spark:** Understanding Apache Spark and its use in big data processing.
- **Big Data Frameworks:** Comparing different frameworks and their applications.

16.5 Data Security in Cloud Hosting

An in-depth look into data security practices in cloud hosting environments, including encryption and access managem

Key Topics:

- **Encryption:** Techniques for encrypting data at rest and in transit.
- **Access Management:** Strategies for managing user access and permissions.
- **Security Protocols:** Implementing security protocols to protect data in the cloud.

16.6 Containerization and Microservices

Understanding containerization technologies like Docker and Kubernetes and their role in hosting services.

Key Topics:

- **Docker:** Basics of Docker and containerization.
- **Kubernetes:** Orchestration of containerized applications using Kubernetes.

- **Microservices Architecture:** Designing applications using microservices for scalability and flexibility.

16.7 Distributed Systems

Study of distributed computing systems architecture, design, and management.

Key Topics:

- **Distributed Computing:** Principles and challenges of distributed systems.
- **System Architecture:** Designing and managing distributed system architectures.
- **Consistency and Fault Tolerance:** Ensuring consistency and reliability in distributed environments.

16.8 Data Warehousing and Analytics

Techniques and tools used to design data warehouses and leverage analytics for business intelligence.

Key Topics:

- **Data Warehousing:** Design and implementation of data warehouses.
- **ETL Processes:** Extract, Transform, Load processes for data warehousing.
- **Business Intelligence:** Leveraging analytics for decision-making and insights.

16.9 Serverless Computing

Exploration of serverless computing models and their application in data hosting services.

Key Topics:

- **Serverless Models:** Understanding Function as a Service (FaaS) and Backend as a Service (BaaS).
- **Benefits of Serverless:** Scalability, cost-efficiency, and simplified management.
- **Use Cases:** Real-world applications of serverless computing.

These topics provide a comprehensive understanding of data processing and hosting services in computer engineering,

If you have any specific questions or need more details on a

17.topics

4.1 .12.15..17.1.Masters in Cryptocurrency and Blockchain Applications

This course provides an in-depth exploration of blockchain technology and digital currency. Students will learn about th
world applications. Emphasis will be placed on developing a practical understanding of blockchain software, digital curr

17.2.Introduction to Blockchain Technology

Learn the fundamentals of blockchain technology, including its history, key concepts, and how it differs from traditiona

17.2.Cryptocurrencies: An Overview

Understand the various types of cryptocurrencies, their functions, and the economics underlying digital currencies.

17.3.Blockchain Consensus Mechanisms

Explore how consensus mechanisms like Proof of Work, Proof of Stake, and others operate within blockchain networks

17.4..Smart Contracts

Learn about smart contracts, their capabilities, use cases, and limitations. Understand how they are deployed and man

17.5.Decentralized Finance (DeFi)

Explore the growth of DeFi platforms and how they are revolutionizing traditional financial systems.

17.6.Blockchain in Supply Chain Management

Understand how blockchain technology is applied in supply chain management to enhance transparency and efficiency

17.7.Regulation and Compliance in Blockchain

Study the regulatory landscape surrounding blockchain technology and cryptocurrencies, including the challenges and

17.8.NFTs and Digital Assets

Explore the world of Non-Fungible Tokens (NFTs), their creation, market dynamics, and how they impact digital owners

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17.1 Masters in Cryptocurrency and Blockchain Applications

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world applications. Emphasis will be placed on developing a practical understanding of blockchain software, digital curr

17.2 Introduction to Blockchain Technology

Learn the fundamentals of blockchain technology, including its history, key concepts, and how it differs from traditiona

Key Topics:

- **History of Blockchain:** Tracing the origins and evolution of blockchain technology.

- **Key Concepts:** Understanding blocks, chains, nodes, and consensus mechanisms.

- **Differences from Traditional Databases:** Comparing blockchain to centralized databases in terms of struc

17.3 Cryptocurrencies: An Overview

Understand the various types of cryptocurrencies, their functions, and the economics underlying digital currencies.

Key Topics:

- **Types of Cryptocurrencies:** Bitcoin, Ethereum, altcoins, and stablecoins.

- **Functions of Cryptocurrencies:** Medium of exchange, store of value, and investment asset.

- **Economics of Digital Currencies:** Supply, demand, market capitalization, and price volatility.

17.4 Blockchain Consensus Mechanisms

Explore how consensus mechanisms like Proof of Work, Proof of Stake, and others operate within blockchain networks

Key Topics:

- **Proof of Work (PoW):** Understanding the mining process, energy consumption, and security.

- **Proof of Stake (PoS):** Staking, validators, and energy efficiency.

- **Alternative Consensus Mechanisms:** Delegated Proof of Stake (DPoS), Practical Byzantine Fault Tolerance

17.5 Smart Contracts

Learn about smart contracts, their capabilities, use cases, and limitations. Understand how they are deployed and man

Key Topics:

- **Definition and Functionality:** What smart contracts are and how they work.

- **Use Cases:** Applications in finance, supply chain, real estate, and other industries.

- **Limitations:** Challenges such as scalability, security vulnerabilities, and legal considerations.

17.6 Decentralized Finance (DeFi)

Explore the growth of DeFi platforms and how they are revolutionizing traditional financial systems.

Key Topics:

- **Overview of DeFi:** Understanding the principles and goals of decentralized finance.

- **DeFi Platforms:** Popular platforms like Uniswap, Aave, and Compound.

- **Impact on Traditional Finance:** How DeFi is transforming lending, borrowing, trading, and asset managem

17.7 Blockchain in Supply Chain Management

Understand how blockchain technology is applied in supply chain management to enhance transparency and efficiency

Key Topics:

- **Transparency and Traceability:** How blockchain improves visibility and tracking in supply chains.

- **Efficiency Improvements:** Reducing fraud, errors, and delays in supply chain processes.

- **Case Studies:** Real-world examples of blockchain applications in supply chain management.

17.8 Regulation and Compliance in Blockchain

Study the regulatory landscape surrounding blockchain technology and cryptocurrencies, including the challenges and

Key Topics:

- **Regulatory Frameworks:** Understanding the legal regulations governing blockchain and cryptocurrencies.

- **Compliance Requirements:** Ensuring compliance with anti-money laundering (AML) and know your custo

- **Challenges and Opportunities:** Navigating the evolving regulatory environment and its impact on the bloc

17.9 NFTs and Digital Assets

Explore the world of Non-Fungible Tokens (NFTs), their creation, market dynamics, and how they impact digital owners

Key Topics:

- **Introduction to NFTs:** Understanding what NFTs are and how they work.

- **Market Dynamics:** Trends, marketplaces, and the economic aspects of NFTs.

- **Impact on Digital Ownership:** How NFTs are changing the landscape of digital art, collectibles, and intelle

These topics provide a comprehensive understanding of cryptocurrency and blockchain applications, equipping studen

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18 topic

4.1 .12.15.18.1.Advanced Cybersecurity in Bibliotechnology

This course explores the intersection of cybersecurity and bibliotechnology, focusing on protecting digital library syster specifically tailored for bibliotechnology, ensuring the safety and security of digital libraries and bibliographic databases

18.2.Introduction to Cybersecurity in Bibliotechnology

An overview of the basic principles of cybersecurity and their importance in the domain of bibliotechnology.

18.3Threats and Vulnerabilities in Digital Libraries

Understanding the common cybersecurity threats and vulnerabilities unique to digital

18.4.Data Privacy and Integrity in Bibliotechnology

Exploring techniques to ensure data privacy and maintain data integrity for library users and their digital interactions.

18.5.Implementing Security Policies for Digital Libraries

Developing and applying security policies and frameworks tailored for digital libraries to safeguard information assets.

18.6.Access Control in Library Networks

Examining access control mechanisms to secure user authentication and authorization within library systems.

18.7.Digital Rights Management in Bibliotechnology

Understanding digital rights management and its role in protecting digital content in bibliotechnology.

18.8.Network Security Essentials for Digital Libraries

Learn the essentials of securing library networks, combating network-based threats, and implementing robust network

18.9.Incident Response and Recovery for Digital Libraries

Strategies for effectively responding to and recovering from cybersecurity incidents within digital library environments.

18..10Emerging Cybersecurity Technologies in Bibliotechnology

Explore the role of emerging technologies like AI and blockchain in enhancing cybersecurity in bibliotechnology.

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18.2 Introduction to Cybersecurity in Bibliotechnology

An overview of the basic principles of cybersecurity and their importance in the domain of bibliotechnology.

Key Topics:

- **Cybersecurity Principles:** Basic concepts of cybersecurity such as confidentiality, integrity, and availability

- **Importance in Bibliotechnology:** Understanding why cybersecurity is crucial for digital libraries and biblio

- **Common Cyber Threats:** Identifying typical cyber threats that can affect bibliotechnological systems.

18.3 Threats and Vulnerabilities in Digital Libraries

Understanding the common cybersecurity threats and vulnerabilities unique to digital libraries.

Key Topics:

- **Threat Landscape:** Overview of threats such as malware, phishing, and ransomware.

- **Vulnerabilities:** Identifying and assessing vulnerabilities specific to digital library systems.

- **Risk Assessment:** Techniques for evaluating and mitigating risks in digital libraries.

18.4 Data Privacy and Integrity in Bibliotechnology

Exploring techniques to ensure data privacy and maintain data integrity for library users and their digital interactions.

Key Topics:

- **Data Privacy Techniques:** Implementing privacy measures such as anonymization and encryption.

- **Data Integrity:** Ensuring that data remains accurate and unaltered through checksums and hashes.

- **User Data Protection:** Protecting sensitive information related to library users.

18.5 Implementing Security Policies for Digital Libraries

Developing and applying security policies and frameworks tailored for digital libraries to safeguard information assets.

Key Topics:

- **Policy Development:** Crafting comprehensive security policies for digital libraries.

- **Frameworks:** Utilizing existing security frameworks like ISO/IEC 27001.

- **Policy Enforcement:** Strategies for enforcing and maintaining security policies.

18.6 Access Control in Library Networks

Examining access control mechanisms to secure user authentication and authorization within library systems.

Key Topics:

- **Authentication Methods:** Techniques such as passwords, biometrics, and multi-factor authentication.

- **Authorization:** Ensuring proper access controls and role-based access within library networks.

- **Access Management Tools:** Using tools and software to manage access controls effectively.

18.7 Digital Rights Management in Bibliotechnology

Understanding digital rights management (DRM) and its role in protecting digital content in bibliotechnology.

Key Topics:

- **DRM Principles:** Basic concepts and purposes of DRM.

- **DRM Technologies:** Tools and technologies used for implementing DRM in digital libraries.

- **Content Protection:** Strategies for protecting digital content from unauthorized access and distribution.

18.8 Network Security Essentials for Digital Libraries

Learn the essentials of securing library networks, combating network-based threats, and implementing robust network

Key Topics:

- **Network Security Fundamentals:** Understanding firewalls, intrusion detection/prevention systems, and V

- **Network Threats:** Identifying and mitigating threats such as DDoS attacks and man-in-the-middle attacks

- **Security Measures:** Best practices for securing network infrastructure in digital libraries.

18.9 Incident Response and Recovery for Digital Libraries

Strategies for effectively responding to and recovering from cybersecurity incidents within digital library environments.

Key Topics:

- **Incident Response Planning:** Developing and implementing incident response plans.

- **Recovery Techniques:** Strategies for recovering data and services after a cybersecurity incident.

- **Post-Incident Analysis:** Conducting root cause analysis and improving security measures.

18.10 Emerging Cybersecurity Technologies in Bibliotechnology

Explore the role of emerging technologies like AI and other advanced tools in enhancing cybersecurity in bibliotechnolo

Key Topics:

- **AI in Cybersecurity:** Utilizing artificial intelligence for threat detection and response.

- **Blockchain Technology:** Applying blockchain for secure and transparent data management.

- **Future Trends:** Exploring future trends and advancements in cybersecurity technologies.

These courses provide a comprehensive understanding of advanced cybersecurity principles and practices in the conte

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19 topics

4.1 .12.15..19.1.1Edge Computing in Modern Power and Energy Systems

This course provides an in-depth exploration of edge computing technologies and their integration into modern power distribution, improve grid reliability, and enhance energy management. The course covers various topics such as distrib

19.2..Introduction to Edge Computing

An overview of edge computing and its significance in the modern power and energy sectors. It covers the basics of edg

19.3.Distributed Computing in Energy Systems

Explores how distributed computing operates in energy systems to enhance performance, reliability, and efficiency.

19.4.IoT Applications in Power Systems

Discusses the role of IoT devices in modern power systems for data collection, analysis, and decision-making.

19.5.Real-time Data Processing

Focuses on techniques for real-time data processing at the edge, including algorithms and architectures suited for ener

19.6Security and Privacy in Edge Computing

Examines the security challenges in edge computing environments and how they impact energy systems, with strategie

19.6.Edge Analytics for Energy Management

Investigates the use of edge analytics for optimizing energy management through predictive analytics and machine lea

19.7.Energy Efficiency Optimization

Covers strategies for improving energy efficiency through edge computing technologies and smart grids.

19.8.Case Studies on Edge Computing in Energy

Presents real-world case studies to illustrate the deployment and impact of edge computing in energy systems.

19.9.Future Trends in Edge Computing for Energy Systems

Explores future developments and potential advancements in edge computing applicable to power and energy systems

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An overview of edge computing and its significance in the modern power and energy sectors. It covers the basics of edg

Key Topics:

- **Edge Nodes:** Understanding the role of edge nodes in data processing.
- **Latency Reduction:** Techniques to reduce latency and improve response times.
- **System Efficiency:** Enhancing overall system efficiency through edge computing.

19.3 Distributed Computing in Energy Systems

Explores how distributed computing operates in energy systems to enhance performance, reliability, and efficiency.

Key Topics:

- **Distributed Computing Principles:** Basics of distributed computing and its application in energy systems.
- **Performance Enhancement:** Improving system performance through distributed computing.
- **Reliability and Efficiency:** Ensuring system reliability and operational efficiency.

19.4 IoT Applications in Power Systems

Discusses the role of IoT devices in modern power systems for data collection, analysis, and decision-making.

Key Topics:

- **IoT Devices:** Types and functions of IoT devices in power systems.
- **Data Collection and Analysis:** Leveraging IoT for real-time data collection and analysis.
- **Decision-Making:** Enhancing decision-making processes using IoT data.

19.5 Real-time Data Processing

Focuses on techniques for real-time data processing at the edge, including algorithms and architectures suited for ener

Key Topics:

- **Real-time Processing Techniques:** Algorithms and architectures for real-time data processing.
- **Edge Processing:** Advantages and challenges of processing data at the edge.

- **Application in Energy Systems:** Implementing real-time data processing in energy management.

19.6 Security and Privacy in Edge Computing

Examines the security challenges in edge computing environments and how they impact energy systems, with strategie

Key Topics:

- **Security Challenges:** Identifying security threats in edge computing environments.
- **Privacy Concerns:** Ensuring data privacy in distributed systems.
- **Mitigation Strategies:** Techniques for mitigating security and privacy risks.

19.7 Edge Analytics for Energy Management

Investigates the use of edge analytics for optimizing energy management through predictive analytics and machine lea

Key Topics:

- **Edge Analytics:** Understanding edge analytics and its benefits.
- **Predictive Analytics:** Using predictive analytics for proactive energy management.
- **Machine Learning:** Applying machine learning models to enhance energy efficiency.

19.8 Energy Efficiency Optimization

Covers strategies for improving energy efficiency through edge computing technologies and smart grids.

Key Topics:

- **Energy Optimization Techniques:** Methods for optimizing energy use.
- **Smart Grids:** Role of smart grids in energy efficiency.
- **Integration with Edge Computing:** How edge computing enhances energy optimization efforts.

19.9 Case Studies on Edge Computing in Energy

Presents real-world case studies to illustrate the deployment and impact of edge computing in energy systems.

Key Topics:

- **Case Studies:** Examples of successful edge computing implementations.
- **Deployment Challenges:** Overcoming challenges in deploying edge computing solutions.

- **Impact Assessment:** Evaluating the impact of edge computing on energy management.

19.10 Future Trends in Edge Computing for Energy Systems

Explores future developments and potential advancements in edge computing applicable to power and energy systems

Key Topics:

- **Emerging Technologies:** Future technologies that could shape edge computing.
- **Trends in Energy Systems:** Anticipating trends and advancements in energy management.
- **Research and Development:** Ongoing and future research initiatives in edge computing.

These courses provide a comprehensive understanding of edge computing in modern power and energy systems, equip energy management.

If you have any specific questions or need more details on any of these topics, feel free to ask!

Edge Computing for Modern Power and Energy Systems

This advanced course explores the role and integration of edge computing technologies in modern power and energy s efficiency, reliability, and sustainability in energy systems. Students will learn through theoretical insights and practical

Introduction to Edge Computing

Understanding the basic concepts and architecture of edge computing, its significance in reducing latency and improvin

Role of Edge Computing in Smart Grids

Exploring how edge computing supports smart grid operations including demand response, grid stability, and energy di

Edge Computing for Renewable Energy Integration

Analyzing the integration of renewable energy sources into power grids using edge computing to enhance efficiency an

Data Management and Security in Edge Computing

Understanding how data is managed and secured in edge computing systems, with a focus on the challenges and solut

Machine Learning Applications on the Edge

Investigating the applications of machine learning in edge devices to predict and optimize energy consumption and dist

Case Studies in Edge Computing for Energy Systems

Reviewing real-world case studies to understand the implementation and outcomes of edge computing in energy syste

Challenges and Future Trends

Discussing the current challenges faced by edge computing in energy systems and predicting future trends and technol

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20 topics

4.1 .12.15..20.1.Masters in Cyber-Physical Systems and Information Technology

This course provides an in-depth understanding of Cyber-Physical Systems (CPS) within the realm of Information Techn design, and application of CPS in various sectors. Through a combination of theoretical studies and practical assignmen

20.2.Introduction to Cyber-Physical Systems

This topic covers the basics of CPS, including definitions, history, and key concepts that distinguish CPS from traditional

20.3.Architecture of CPS

Explore the architecture of CPS, focusing on sensors, actuators, control systems, and the role of internet of things (IoT)

20.4Networking and Communication in CPS

Understand the communication protocols and networks that enable interaction between cyber and physical componer

20.5.CPS Security and Privacy

This topic delves into the security challenges in CPS and discusses methods to ensure data integrity and privacy.

20.6.Machine Learning in CPS

Examine the role of machine learning in optimizing the performance and decision-making processes within CPS.

20.7.Real-Time Systems and CPS

Learn about the real-time requirements of CPS and the design considerations necessary to meet these requirements.

20.8.Simulation and Modeling in CPS

Explore tools and methodologies for simulating and modeling CPS to optimize design and operation.

20.9..Applications and Case Studies of CPS

Analyze various applications of CPS in industries like healthcare, automotive, and smart grids with real-world case studi

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20.1 Masters in Cyber-Physical Systems and Information Technology

This course provides an in-depth understanding of Cyber-Physical Systems (CPS) within the realm of Information Techn design, and application of CPS in various sectors. Through a combination of theoretical studies and practical assignmen

20.2 Introduction to Cyber-Physical Systems

This topic covers the basics of CPS, including definitions, history, and key concepts that distinguish CPS from traditional

Key Topics:

- **Definitions:** Understanding what CPS are and how they operate.
- **History:** Tracing the development and evolution of CPS.
- **Key Concepts:** Exploring the unique attributes of CPS, such as real-time computing and system integratio

20.3 Architecture of CPS

Explore the architecture of CPS, focusing on sensors, actuators, control systems, and the role of the Internet of Things (

Key Topics:

- **Sensors and Actuators:** Understanding their roles and how they interact within CPS.
- **Control Systems:** Examining the mechanisms that manage and control physical processes.
- **IoT Integration:** The role of IoT in enhancing CPS functionality and connectivity.

20.4 Networking and Communication in CPS

Understand the communication protocols and networks that enable interaction between cyber and physical componer

Key Topics:

- **Communication Protocols:** Exploring various protocols used in CPS for data transmission.
- **Network Architecture:** Designing and managing networks to support CPS operations.
- **Data Exchange:** Ensuring efficient and secure data exchange between components.

20.5 CPS Security and Privacy

This topic delves into the security challenges in CPS and discusses methods to ensure data integrity and privacy.

Key Topics:

- **Security Challenges:** Identifying and addressing vulnerabilities in CPS.
- **Data Integrity:** Techniques for ensuring the accuracy and reliability of data.
- **Privacy Measures:** Protecting sensitive information within CPS environments.

20.6 Machine Learning in CPS

Examine the role of machine learning in optimizing the performance and decision-making processes within CPS.

Key Topics:

- **Machine Learning Algorithms:** Applying algorithms to enhance CPS functionality.
- **Optimization:** Using machine learning for predictive maintenance and performance improvement.
- **Decision-Making:** Enhancing automated decision-making processes in CPS.

20.7 Real-Time Systems and CPS

Learn about the real-time requirements of CPS and the design considerations necessary to meet these requirements.

Key Topics:

- **Real-Time Computing:** Understanding the principles of real-time systems.
- **Design Considerations:** Ensuring CPS can meet strict timing constraints.
- **Application Scenarios:** Real-world examples of real-time CPS applications.

20.8 Simulation and Modeling in CPS

Explore tools and methodologies for simulating and modeling CPS to optimize design and operation.

Key Topics:

- **Simulation Tools:** Overview of tools used for CPS simulation.
- **Modeling Techniques:** Creating accurate models of CPS for analysis and optimization.
- **Design Optimization:** Using simulations to improve CPS design and performance.

20.9 Applications and Case Studies of CPS

Analyze various applications of CPS in industries like healthcare, automotive, and smart grids with real-world case studi

Key Topics:

- **Industry Applications:** Exploring how CPS are applied in different sectors.
- **Case Studies:** Reviewing successful implementations and their outcomes.
- **Lessons Learned:** Understanding the challenges and solutions in real-world CPS projects.

These courses provide a comprehensive understanding of Cyber-Physical Systems and their integration within Informat

21 topics

4.1 .12.15.21.1.Masters in Distributed-Ledger Technology Applications in Educational Technology

This course explores the integration of distributed ledger technologies (DLT), such as blockchain, into educational techn educational content, secure credentialing, and enhancing educational efficiencies. The course equips students with bot methodologies.

21.1.

An overview of distributed ledger technology including blockchain, its history, and basic principles that empower decen

21.2.The Need for Distributed Ledger Technology in Education

Examine the challenges in the current educational systems and how DLT can address issues around data security, integ

21.3.Blockchain for Secure Credentialing

Explore how blockchain can be used for secure credentialing, providing reliable storage and easy verification of educati

21.4.Smart Contracts in Educational Transactions

Learn about smart contracts and how they can optimize and automate payment systems, enrollments, and certificatior

21.5..DLT-based Learning Management Systems

Investigate the potential of DLT to revolutionize Learning Management Systems (LMS) by enabling decentralized data n

Privacy and Data Security in DLT

Understand the privacy considerations and security protocols of DLT systems and how data privacy is enhanced within

21.6.Case Studies of DLT in Education

Review real-world implementations of DLT in education and analyze the outcomes and lessons learned from these case

21.7.Future Trends in DLT and EdTech

Delve into the emerging trends and future directions of DLT applications in educational technology.

21.1 Masters in Distributed-Ledger Technology Applications in Educational Technology

This course explores the integration of distributed ledger technologies (DLT), such as blockchain, into educational techn educational content, secure credentialing, and enhancing educational efficiencies. The course equips students with bot

methodologies.

21.2 Introduction to Distributed Ledger Technology

An overview of distributed ledger technology including blockchain, its history, and basic principles that empower decer

Key Topics:

- **History of DLT:** Understanding the origins and evolution of distributed ledger technology.
- **Basic Principles:** Exploring the core principles of decentralization, transparency, and immutability.
- **Blockchain Technology:** Introduction to blockchain and how it functions as a distributed ledger.

21.3 The Need for Distributed Ledger Technology in Education

Examine the challenges in the current educational systems and how DLT can address issues around data security, integ

Key Topics:

- **Current Challenges:** Identifying problems such as data breaches, fraud, and inefficiencies.
- **DLT Solutions:** How distributed ledger technology can enhance data security, ensure data integrity, and r
- **Case Examples:** Real-world scenarios where DLT has been implemented in education.

21.4 Blockchain for Secure Credentialing

Explore how blockchain can be used for secure credentialing, providing reliable storage and easy verification of educati

Key Topics:

- **Credentialing Issues:** Understanding the issues with traditional credentialing methods.
- **Blockchain Solutions:** How blockchain ensures secure and tamper-proof credentialing.
- **Verification:** The process of verifying educational credentials using blockchain.

21.5 Smart Contracts in Educational Transactions

Learn about smart contracts and how they can optimize and automate payment systems, enrollments, and certificatior

Key Topics:

- **Smart Contracts:** Understanding what smart contracts are and how they work.
- **Applications in Education:** Using smart contracts for automating payments, enrollments, and certificatior
- **Benefits and Challenges:** Exploring the advantages and potential challenges of implementing smart contr

21.6 DLT-based Learning Management Systems

Investigate the potential of DLT to revolutionize Learning Management Systems (LMS) by enabling decentralized data m

Key Topics:

- **DLT Integration:** How distributed ledger technology can be integrated into LMS.
- **Decentralized Data Management:** Benefits of decentralized data management for educational institution
- **Analytics:** Leveraging DLT for enhanced data analytics and insights.

21.7 Privacy and Data Security in DLT

Understand the privacy considerations and security protocols of DLT systems and how data privacy is enhanced within

Key Topics:

- **Privacy Protocols:** Implementing privacy protocols in DLT systems.
- **Data Security:** Ensuring the security of data stored and managed on distributed ledgers.
- **Educational Contexts:** Specific considerations for enhancing data privacy in educational environments.

21.8 Case Studies of DLT in Education

Review real-world implementations of DLT in education and analyze the outcomes and lessons learned from these case

Key Topics:

- **Case Studies:** Detailed analysis of successful DLT implementations in educational settings.
- **Outcomes:** Understanding the impact of DLT on educational processes.
- **Lessons Learned:** Key takeaways and best practices from real-world examples.

21.9 Future Trends in DLT and EdTech

Delve into the emerging trends and future directions of DLT applications in educational technology.

Key Topics:

- **Emerging Trends:** Identifying new and upcoming trends in DLT and EdTech.
- **Future Directions:** Exploring potential future developments in DLT applications for education.
- **Research and Innovation:** Current and future research initiatives in the field of DLT and educational techn

These courses provide a comprehensive understanding of distributed ledger technology applications in educational tec

22 topics

4.1 .12.15.22.1.Master's in Adult Education Services

This course is designed for educators and professionals aspiring to excel in the field of adult education. It focuses on tea learners. The course aims to prepare students to effectively design and implement educational programs that cater to

22.1.Introduction to Adult Education

An overview of the principles and practices in adult education, including historical perspectives and modern developme

22.2.Theories of Adult Learning

Exploration of key theories such as Andragogy, Transformative Learning, and Experiential Learning that inform adult ed

22.3.Curriculum Design for Adult Learners

Techniques and strategies for developing effective curricula tailored to adult learners' needs and goals.

22.4.Assessment and Evaluation in Adult Education

Methods for assessing adult learners' progress and program effectiveness, including formative and summative evaluati

22.5.Technology Integration in Adult Learning

Utilizing digital tools and technologies to enhance adult learning experiences.

22.6.Diversity and Inclusion in Adult Education

Addressing the diverse backgrounds, identities, and learning styles of adult learners.

22.7.Motivational Strategies for Adult Learners

Strategies to engage and motivate adult learners, fostering a positive and productive learning environment.

22.8.Professional Development for Adult Educators

Resources and strategies for ongoing professional growth and development in adult education.-

22.1 Master's in Adult Education Services

This course is designed for educators and professionals aspiring to excel in the field of adult education. It focuses on tea learners. The course aims to prepare students to effectively design and implement educational programs that cater to

22.2 Introduction to Adult Education

An overview of the principles and practices in adult education, including historical perspectives and modern developme

Key Topics:

- **Principles of Adult Education:** Understanding the foundational principles guiding adult education.
- **Historical Perspectives:** Tracing the evolution of adult education practices.
- **Modern Developments:** Exploring recent advancements and trends in adult education.

22.3 Theories of Adult Learning

Exploration of key theories such as Andragogy, Transformative Learning, and Experiential Learning that inform adult ed

Key Topics:

- **Andragogy:** Principles of adult learning introduced by Malcolm Knowles.
- **Transformative Learning:** How transformative experiences foster deep learning in adults.
- **Experiential Learning:** The role of hands-on experiences and reflection in adult learning.

22.4 Curriculum Design for Adult Learners

Techniques and strategies for developing effective curricula tailored to adult learners' needs and goals.

Key Topics:

- **Needs Assessment:** Identifying the learning needs of adult learners.
- **Curriculum Planning:** Creating structured and flexible curricula that accommodate adult learners.
- **Instructional Strategies:** Implementing various teaching methods to enhance learning.

22.5 Assessment and Evaluation in Adult Education

Methods for assessing adult learners' progress and program effectiveness, including formative and summative evaluati

Key Topics:

- **Formative Assessment:** Techniques for ongoing assessment to support learning.
- **Summative Evaluation:** Evaluating learner outcomes at the end of a program.
- **Program Effectiveness:** Measuring the success and impact of adult education programs.

22.6 Technology Integration in Adult Learning

Utilizing digital tools and technologies to enhance adult learning experiences.

Key Topics:

- **E-Learning Platforms:** Using online platforms to deliver educational content.
- **Blended Learning:** Combining face-to-face and online learning methods.
- **Tech Tools:** Incorporating various digital tools to support teaching and learning.

22.7 Diversity and Inclusion in Adult Education

Addressing the diverse backgrounds, identities, and learning styles of adult learners.

Key Topics:

- **Cultural Competence:** Understanding and respecting cultural differences in the classroom.
- **Inclusive Practices:** Implementing strategies to create inclusive learning environments.
- **Learning Styles:** Adapting teaching methods to accommodate different learning styles.

22.8 Motivational Strategies for Adult Learners

Strategies to engage and motivate adult learners, fostering a positive and productive learning environment.

Key Topics:

- **Motivational Theories:** Exploring theories that explain adult learner motivation.
- **Engagement Techniques:** Practical strategies to keep adult learners engaged.
- **Supportive Environment:** Creating a learning environment that encourages persistence and success.

22.9 Professional Development for Adult Educators

Resources and strategies for ongoing professional growth and development in adult education.

Key Topics:

- **Continuing Education:** Opportunities for adult educators to enhance their skills and knowledge.
- **Professional Networks:** Building and leveraging networks for support and growth.
- **Reflective Practice:** Encouraging self-reflection to improve teaching practices.

These courses provide a comprehensive understanding of adult education services, equipping educators with the know

23 topics

4.1 .12.15.23.1Quantum Computing in Systems Engineering

This course provides an in-depth exploration of quantum computing principles and their applications within the field of practical implementations of quantum technologies in designing and optimizing complex systems.

23.1.Introduction to Quantum Computing

An overview of the principles of quantum mechanics that form the basis of quantum computing technology, including c

23.2.Quantum Algorithms

Detailed study of key quantum algorithms such as Shor's algorithm and Grover's algorithm, and their implications for sc

22.3.Quantum Gates and Circuits

Exploration of fundamental quantum gates and the construction of quantum circuits to perform computational tasks u

22.4.Quantum Information Theory

Understanding the theoretical underpinnings of how quantum mechanics enhances information processing capabilities

22.5.Quantum Computing Platforms

Introduction to current quantum computing platforms and hardware, including superconducting qubits and trapped io

22.6.Quantum Programming Languages

Learning and applying quantum programming languages such as Qiskit, Cirq, and Q# to develop quantum algorithms.

22.7.Applications of Quantum Computing in Systems Engineering

Investigation of potential applications of quantum computing in systems engineering, including optimization, simulatio

22.8.Challenges and Future of Quantum Computing

Discussion on the current challenges facing the field of quantum computing and potential directions for future research

22.9.Quantum Supremacy and its Implications

Examination of the concept of quantum supremacy and its potential to revolutionize computing systems.

23.1 Quantum Computing in Systems Engineering

This course provides an in-depth exploration of quantum computing principles and their applications within the field of practical implementations of quantum technologies in designing and optimizing complex systems.

23.1 Introduction to Quantum Computing

An overview of the principles of quantum mechanics that form the basis of quantum computing technology, including c

Key Topics:

- **Qubits:** Understanding the basic unit of quantum information.
- **Superposition:** How qubits can exist in multiple states simultaneously.
- **Entanglement:** The phenomenon where qubits become interconnected and the state of one affects the s

23.2 Quantum Algorithms

Detailed study of key quantum algorithms such as Shor's algorithm and Grover's algorithm, and their implications for sc

Key Topics:

- **Shor's Algorithm:** How it factors large numbers exponentially faster than classical algorithms.
- **Grover's Algorithm:** Quantum search algorithm providing quadratic speedup.
- **Implications:** Potential applications in cryptography, optimization, and more.

23.3 Quantum Gates and Circuits

Exploration of fundamental quantum gates and the construction of quantum circuits to perform computational tasks u

Key Topics:

- **Quantum Gates:** Basic gates such as Pauli-X, Hadamard, and CNOT.
- **Quantum Circuits:** Building and understanding circuits composed of quantum gates.
- **Quantum Operations:** Executing operations and measuring results.

23.4 Quantum Information Theory

Understanding the theoretical underpinnings of how quantum mechanics enhances information processing capabilities

Key Topics:

- **Quantum Entropy:** Measures of information and uncertainty in quantum systems.
- **Quantum Error Correction:** Techniques to protect quantum information from errors.
- **Quantum Channels:** Understanding communication channels in quantum information theory.

23.5 Quantum Computing Platforms

Introduction to current quantum computing platforms and hardware, including superconducting qubits and trapped io

Key Topics:

- **Superconducting Qubits:** How they work and their role in quantum computers.
- **Trapped Ions:** Another leading technology for building quantum computers.
- **Quantum Hardware:** Overview of different types of quantum computing hardware.

23.6 Quantum Programming Languages

Learning and applying quantum programming languages such as Qiskit, Cirq, and Q# to develop quantum algorithms.

Key Topics:

- **Qiskit:** IBM's open-source quantum computing framework.
- **Cirq:** Google's framework for developing quantum algorithms.
- **Q#:** Microsoft's quantum programming language.
- **Algorithm Development:** Writing and testing quantum algorithms.

23.7 Applications of Quantum Computing in Systems Engineering

Investigation of potential applications of quantum computing in systems engineering, including optimization, simulatio

Key Topics:

- **Optimization:** Using quantum computing to solve complex optimization problems.
- **Simulation:** Quantum simulations of physical systems.
- **Cryptography:** How quantum computing can enhance or break cryptographic systems.

23.8 Challenges and Future of Quantum Computing

Discussion on the current challenges facing the field of quantum computing and potential directions for future research

Key Topics:

- **Scalability:** Challenges in scaling up quantum computers.
- **Decoherence:** Addressing the issue of qubit stability over time.
- **Future Research:** Directions for advancements in quantum computing technology.

23.9 Quantum Supremacy and its Implications

Examination of the concept of quantum supremacy and its potential to revolutionize computing systems.

Key Topics:

- **Quantum Supremacy:** Understanding what it means for a quantum computer to outperform classical cor
- **Implications:** The potential impact on various industries and fields.
- **Milestones:** Significant achievements in reaching quantum supremacy.

These courses provide a comprehensive understanding of quantum computing in systems engineering, equipping stude

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23.1 topics:

4.1 .12.15..23.2.Neurotechnology in Educational Technology

This course explores the intersection of neurotechnology and educational technology, focusing on how advances in bra theoretical aspects, practical applications, as well as ethical implications of utilizing neurotechnology in education.

23.3.Introduction to Neurotechnology

This topic provides a foundational understanding of neurotechnology, including its history, development, and current s

23.4.Neuroscience Basics for Educators

An overview of essential neuroscience principles necessary for understanding how neurotechnology can be applied in e

23.5.Brain-Computer Interfaces in Education

Examine how Brain-Computer Interfaces (BCIs) can be used to facilitate learning, including current applications and fut

23.6.Cognitive Load Theory and Neurotechnology

Understand how cognitive load theory informs the design of neurotechnology applications in learning environments.

23.7.Neuroscience-Based Adaptive Learning Technologies

Explore how adaptive learning technologies informed by neuroscience can personalize and enhance educational experi

23.8.Ethical and Social Implications

Consider the ethical and social implications of using neurotechnology in educational settings, including privacy concern

23.9.Case Studies in Neurotechnology Education

Review real-world case studies where neurotechnology has been applied within educational contexts and assess their c

23.10.Future Trends in Neurotechnology for Education

Discuss and predict future trends in the deployment of neurotechnology for educational purposes, driven by technolog

23.2 Neurotechnology in Educational Technology

This course explores the intersection of neurotechnology and educational technology, focusing on how advances in bra theoretical aspects, practical applications, as well as ethical implications of utilizing neurotechnology in education.

23.3 Introduction to Neurotechnology

This topic provides a foundational understanding of neurotechnology, including its history, development, and current s

Key Topics:

- **History and Development:** Tracing the evolution of neurotechnology from its inception to current advanc
- **Devices and Technologies:** Overview of brain-computer interfaces (BCIs), neuroimaging tools, and neurot
- **Current State:** Understanding the latest innovations and applications in neurotechnology.

23.4 Neuroscience Basics for Educators

An overview of essential neuroscience principles necessary for understanding how neurotechnology can be applied in e

Key Topics:

- **Brain Structure:** Understanding the anatomy of the brain and its relevance to learning.
- **Brain Function:** Exploring how different brain regions contribute to cognitive processes.
- **Neuroplasticity:** The brain's ability to adapt and reorganize, crucial for learning and memory.

23.5 Brain-Computer Interfaces in Education

Examine how Brain-Computer Interfaces (BCIs) can be used to facilitate learning, including current applications and fut

Key Topics:

- **BCI Technology:** Understanding how BCIs work and their potential in education.
- **Current Applications:** Examples of BCIs being used to aid learning and accessibility.
- **Future Possibilities:** Exploring innovative ways BCIs could transform education.

23.6 Cognitive Load Theory and Neurotechnology

Understand how cognitive load theory informs the design of neurotechnology applications in learning environments.

Key Topics:

- **Cognitive Load Theory:** Basics of cognitive load and its impact on learning.
- **Application Design:** Designing neurotechnology tools that optimize cognitive load.
- **Practical Examples:** Implementing cognitive load principles in educational technology.

23.7 Neuroscience-Based Adaptive Learning Technologies

Explore how adaptive learning technologies informed by neuroscience can personalize and enhance educational experi

Key Topics:

- **Adaptive Learning:** Principles and benefits of adaptive learning systems.
- **Neuroscience Insights:** How neuroscience informs the design of adaptive learning technologies.
- **Personalization:** Creating personalized learning experiences based on cognitive and neurological data.

23.8 Ethical and Social Implications

Consider the ethical and social implications of using neurotechnology in educational settings, including privacy concern

Key Topics:

- **Ethical Considerations:** Addressing issues such as data privacy, informed consent, and potential biases.
- **Social Implications:** Understanding the broader impact of neurotechnology on society and education.
- **Regulatory Frameworks:** Overview of regulations governing the use of neurotechnology in education.

23.9 Case Studies in Neurotechnology Education

Review real-world case studies where neurotechnology has been applied within educational contexts and assess their c

Key Topics:

- **Case Studies:** Detailed examination of successful neurotechnology implementations in education.
- **Outcomes Assessment:** Evaluating the effectiveness and impact of neurotechnology on learning outcome
- **Lessons Learned:** Key takeaways and best practices from real-world examples.

23.10 Future Trends in Neurotechnology for Education

Discuss and predict future trends in the deployment of neurotechnology for educational purposes, driven by technolog

Key Topics:

- **Emerging Trends:** Identifying new and upcoming trends in neurotechnology and education.

- **Future Directions:** Exploring potential future developments and innovations.

- **Research and Innovation:** Current and future research initiatives in the field of neurotechnology for educ

These courses provide a comprehensive understanding of neurotechnology applications in educational technology, equ

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24. topics

4.1 .12.15.24.1.Robotic Process Automation in Electrochemical Engineering

This course explores the integration of Robotic Process Automation (RPA) within the field of Electrochemical Engineerin accuracy, and productivity in electrochemical processes, ranging from battery manufacturing to fuel cell production. St

24.2Introduction to Robotic Process Automation

This module introduces the fundamentals of RPA, covering its history, benefits, and applications across various industri

24.3.Fundamentals of Electrochemical Engineering

Explore the core principles of electrochemical engineering, including electrochemistry, materials science, and process c

24.4.RPA Tools and Platforms

Gain insights into popular RPA tools and platforms like UiPath, Automation Anywhere, and Blue Prism. Understand thei

24.5.Automating Electrochemical Process Controls

Study the application of RPA in automating the control systems within electrochemical processes, improving precision a

24.6.Data Collection and Analysis in Electrochemical Systems

Learn how RPA can facilitate data collection, analysis, and reporting in electrochemical systems, enhancing decision-ma

24.7.Machine Learning and RPA in Electrochemical Engineering

Explore the intersection of machine learning and RPA in electrochemical engineering for predictive maintenance and p

24.8.RPA Implementation Challenges and Solutions

Discuss the challenges faced during the implementation of RPA in electrochemical engineering and explore potential so

24.9.Case Studies and Industry Applications

Analyze various case studies to understand how RPA has been applied successfully in the field of electrochemical engin

4.1 Robotic Process Automation in Electrochemical Engineering

This course explores the integration of Robotic Process Automation (RPA) within the field of Electrochemical Engineerin accuracy, and productivity in electrochemical processes, ranging from battery manufacturing to fuel cell production. St

24.2 Introduction to Robotic Process Automation

This module introduces the fundamentals of RPA, covering its history, benefits, and applications across various industri

Key Topics:

- **History of RPA:** Understanding the origins and evolution of robotic process automation.
- **Benefits:** Exploring the advantages of RPA, such as increased efficiency, reduced errors, and cost savings.
- **Applications:** Examining how RPA is used in various industries, including finance, healthcare, and manufa

24.3 Fundamentals of Electrochemical Engineering

Explore the core principles of electrochemical engineering, including electrochemistry, materials science, and process d

Key Topics:

- **Electrochemistry Basics:** Understanding the chemical processes involved in electrochemical reactions.
- **Materials Science:** Studying the properties and behaviors of materials used in electrochemical systems.
- **Process Design:** Designing efficient and effective electrochemical processes.

24.4 RPA Tools and Platforms

Gain insights into popular RPA tools and platforms like UiPath, Automation Anywhere, and Blue Prism. Understand thei

Key Topics:

- **UiPath:** Overview of UiPath's features and applications.
- **Automation Anywhere:** Exploring Automation Anywhere's capabilities and use cases.
- **Blue Prism:** Understanding Blue Prism's tools and how they are used in RPA.

24.5 Automating Electrochemical Process Controls

Study the application of RPA in automating the control systems within electrochemical processes, improving precision a

Key Topics:

- **Control Systems Automation:** Techniques for automating control systems in electrochemical processes.
- **Precision and Efficiency:** Enhancing precision and efficiency through automation.
- **Real-World Applications:** Examples of automated control systems in electrochemical engineering.

24.6 Data Collection and Analysis in Electrochemical Systems

Learn how RPA can facilitate data collection, analysis, and reporting in electrochemical systems, enhancing decision-ma

Key Topics:

- **Data Collection:** Techniques for automating data collection in electrochemical systems.
- **Data Analysis:** Using RPA to analyze data and generate insights.
- **Reporting:** Automating the generation of reports to support decision-making.

24.7 Machine Learning and RPA in Electrochemical Engineering

Explore the intersection of machine learning and RPA in electrochemical engineering for predictive maintenance and p

Key Topics:

- **Predictive Maintenance:** Using machine learning and RPA for predictive maintenance of electrochemical
- **Process Optimization:** Enhancing process efficiency and effectiveness through machine learning and RPA
- **Case Studies:** Real-world examples of machine learning and RPA in electrochemical engineering.

24.8 RPA Implementation Challenges and Solutions

Discuss the challenges faced during the implementation of RPA in electrochemical engineering and explore potential so

Key Topics:

- **Implementation Challenges:** Identifying common challenges in RPA implementation.
- **Solutions:** Exploring strategies to overcome implementation challenges.
- **Best Practices:** Establishing best practices for successful RPA implementation.

24.9 Case Studies and Industry Applications

Analyze various case studies to understand how RPA has been applied successfully in the field of electrochemical engin

Key Topics:

- **Case Studies:** Detailed analysis of successful RPA implementations in electrochemical engineering.

- **Industry Applications:** Exploring how different sectors use RPA in electrochemical processes.

- **Lessons Learned:** Understanding the key takeaways from real-world applications.

These courses provide a comprehensive understanding of robotic process automation in electrochemical engineering,

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25.1topics

4.1 .12.15.25.1.Integrating Educational Technology in Renewable Energy Studies

This course is designed for master's students interested in combining the fields of renewable energy and educational te innovative teaching tools and strategies. Students will learn how to develop technology-driven educational materials ar

25.2.Introduction to Renewable Energy

An overview of various renewable energy sources, including solar, wind, hydroelectric, and geothermal. Discussions wil

25.3.Educational Technology Tools

Examines the digital tools and platforms available for creating engaging learning

25.4.Designing Interactive Learning Modules

This topic covers the methodologies and best practices for designing interactive and immersive learning modules using

25.5.Gamification in Renewable Energy Education

Explores the concept of gamification and how game-like elements can enhance learning in renewable energy courses.

25.6.Virtual Labs and Simulations

Discusses the role of virtual labs and simulations in teaching complex renewable energy concepts.

25.7.Assessing Learner Outcomes in Technology-Driven Curriculum

This topic focuses on developing assessment strategies for technology-enhanced renewable energy education.

25.8.Case Studies in Renewable Energy Education

Analyzes real-world examples of successful renewable energy educational programs and the role of technology in their

25.9.Challenges in Integrating Technology and Renewable Energy Education

Addresses common challenges faced when integrating technology into renewable energy education and potential solut

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25.1 Integrating Educational Technology in Renewable Energy Studies

This course is designed for master's students interested in combining the fields of renewable energy and educational te
innovative teaching tools and strategies. Students will learn how to develop technology-driven educational materials ar

25.2 Introduction to Renewable Energy

An overview of various renewable energy sources, including solar, wind, hydroelectric, and geothermal. Discussions wil

Key Topics:

- **Solar Energy:** Principles, benefits, challenges, and global usage.
- **Wind Energy:** How wind power works, its advantages, and current implementation.
- **Hydroelectric Energy:** Understanding the mechanics and impact of hydroelectric power.
- **Geothermal Energy:** Exploring how geothermal energy is harnessed and its benefits.

25.3 Educational Technology Tools

Examines the digital tools and platforms available for creating engaging learning experiences.

Key Topics:

- **Digital Learning Platforms:** Overview of tools like Moodle, Canvas, and Google Classroom.
- **Interactive Tools:** Utilizing tools like Kahoot, Quizlet, and interactive whiteboards.
- **Content Creation:** Software for creating educational content, such as Adobe Captivate and Articulate Sto

25.4 Designing Interactive Learning Modules

This topic covers the methodologies and best practices for designing interactive and immersive learning modules using

Key Topics:

- **Module Design:** Principles of designing effective interactive learning modules.
- **Immersive Learning:** Techniques to create immersive learning experiences.
- **Best Practices:** Strategies to enhance engagement and retention through interactivity.

25.5 Gamification in Renewable Energy Education

Explores the concept of gamification and how game-like elements can enhance learning in renewable energy courses.

Key Topics:

- **Gamification Principles:** Understanding the basics of gamification and its educational benefits.

- **Application in Education:** Implementing game elements like points, badges, and leaderboards in renewab

- **Impact on Learning:** How gamification improves motivation and engagement.

25.6 Virtual Labs and Simulations

Discusses the role of virtual labs and simulations in teaching complex renewable energy concepts.

Key Topics:

- **Virtual Labs:** Benefits and examples of virtual labs in renewable energy education.

- **Simulations:** Using simulations to teach and experiment with renewable energy concepts.

- **Implementation:** Best practices for integrating virtual labs and simulations into the curriculum.

25.7 Assessing Learner Outcomes in Technology-Driven Curriculum

This topic focuses on developing assessment strategies for technology-enhanced renewable energy education.

Key Topics:

- **Assessment Methods:** Different methods for assessing learner outcomes in tech-driven education.

- **Formative and Summative Assessment:** Utilizing both to measure progress and final understanding.

- **Data Analysis:** Using data from assessments to improve teaching strategies and learning outcomes.

25.8 Case Studies in Renewable Energy Education

Analyzes real-world examples of successful renewable energy educational programs and the role of technology in their

Key Topics:

- **Case Studies:** Detailed analysis of successful implementations of educational technology in renewable en

- **Technology's Role:** Understanding how technology facilitated learning and engagement.

- **Lessons Learned:** Key takeaways and best practices from real-world examples.

25.9 Challenges in Integrating Technology and Renewable Energy Education

Addresses common challenges faced when integrating technology into renewable energy education and potential solu

Key Topics:

- **Common Challenges:** Identifying barriers such as funding, access to technology, and teacher training.

- **Solutions:** Strategies to overcome these challenges.

- **Future Directions:** Exploring future trends and innovations in the field.

These courses provide a comprehensive understanding of how educational technology can be integrated into renewab

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4.1 .12.15.26.1Wholesale Trade Management in Industrial Engineering

This course is designed for students pursuing a Master's degree in Industrial Engineering with a focus on wholesale trad control, logistics, procurement, and market analysis. The course will blend technical engineering concepts with busines

26.2.Introduction to Wholesale Trade

Explore the fundamentals of wholesale trade, its role in the supply chain, and the economic impact on industrial marke

26.3.Supply Chain Dynamics

Understand the complexities of supply chain management, including network design, integration, and leveraging techn

26.4.Inventory Control Methods

Study various inventory management techniques, such as Just-In-Time, Economic Order Quantity, and ABC analysis to c

26.5.Logistics and Distribution

Examine the logistics involved in wholesale trade, focusing on distribution networks, transportation management, and

26.6.Procurement Strategies

Learn about procurement processes and strategies, vendor selection, and relationship management to secure effective

26.7.Market Analysis and Forecasting

Study techniques for market analysis, trend observation, and forecasting methods to drive strategic decisions in wholes

27.8.Risk Management in Wholesale Trade

Analyze risk management principles, identifying potential risks in the wholesale supply chain and developing mitigation

27.9.Regulatory and Ethical Considerations

Explore the regulatory landscape affecting wholesale trade and the ethical considerations of operating within the secto

26.1 Wholesale Trade Management in Industrial Engineering

This course is designed for students pursuing a Master's degree in Industrial Engineering with a focus on wholesale trad control, logistics, procurement, and market analysis. The course will blend technical engineering concepts with busines

26.2 Introduction to Wholesale Trade

Explore the fundamentals of wholesale trade, its role in the supply chain, and the economic impact on industrial marke

Key Topics:

- **Fundamentals:** Understanding the basics of wholesale trade.
- **Role in Supply Chain:** How wholesale trade fits within the broader supply chain.
- **Economic Impact:** Examining the economic significance of wholesale trade on industrial markets.

26.3 Supply Chain Dynamics

Understand the complexities of supply chain management, including network design, integration, and leveraging techn

Key Topics:

- **Network Design:** Principles of designing efficient supply chain networks.
- **Integration:** Integrating various components of the supply chain for seamless operations.
- **Technology:** Utilizing technology to enhance supply chain efficiency.

26.4 Inventory Control Methods

Study various inventory management techniques, such as Just-In-Time, Economic Order Quantity, and ABC analysis to c

Key Topics:

- **Just-In-Time (JIT):** Minimizing inventory holding costs by receiving goods only as needed.
- **Economic Order Quantity (EOQ):** Calculating the optimal order quantity to minimize total inventory costs
- **ABC Analysis:** Categorizing inventory to prioritize management efforts.

26.5 Logistics and Distribution

Examine the logistics involved in wholesale trade, focusing on distribution networks, transportation management, and

Key Topics:

- **Distribution Networks:** Designing and managing distribution networks.
- **Transportation Management:** Efficiently managing transportation logistics.
- **Warehousing Solutions:** Implementing effective warehousing strategies.

26.6 Procurement Strategies

Learn about procurement processes and strategies, vendor selection, and relationship management to secure effective

Key Topics:

- **Procurement Processes:** Understanding procurement procedures and best practices.
- **Vendor Selection:** Criteria for selecting and evaluating vendors.
- **Relationship Management:** Building and maintaining strong supplier relationships.

26.7 Market Analysis and Forecasting

Study techniques for market analysis, trend observation, and forecasting methods to drive strategic decisions in wholes

Key Topics:

- **Market Analysis:** Techniques for analyzing market conditions and trends.
- **Trend Observation:** Identifying and interpreting market trends.
- **Forecasting Methods:** Using quantitative and qualitative methods to predict future market conditions.

26.8 Risk Management in Wholesale Trade

Analyze risk management principles, identifying potential risks in the wholesale supply chain and developing mitigation

Key Topics:

- **Risk Identification:** Identifying potential risks in the supply chain.
- **Mitigation Strategies:** Developing strategies to mitigate identified risks.
- **Risk Management Frameworks:** Implementing risk management frameworks to ensure supply chain resil

26.9 Regulatory and Ethical Considerations

Understand the regulatory and ethical considerations in wholesale trade, including compliance with laws and promotin

Key Topics:

- **Regulatory Compliance:** Ensuring adherence to relevant laws and regulations.
- **Ethical Business Practices:** Promoting ethical behavior and corporate social responsibility.
- **Case Studies:** Analyzing real-world examples of regulatory and ethical challenges in wholesale trade.

These courses provide a comprehensive understanding of wholesale trade management in industrial engineering, equi

28.topics

4.1 .12.15..29. 1.Advanced Wireless Communications

This course explores the fundamental principles and advanced techniques of wireless communications, designed for st
technologies to prepare students for careers in the telecommunications industry.

29.2.Introduction to Wireless Communications

Overview of wireless communication systems, historical developments, and contemporary applications.

29.3.Radio Frequency Fundamentals

Exploration of radio frequency (RF) spectrum, key RF principles, and their application in wireless communication.

29.4.Wireless Signal Propagation

Understanding the behavior of wireless signals over various media and environments, including path loss, fading, and i

29.5.Multiple Access Techniques

Survey of multiple access schemes including FDMA, TDMA, CDMA, and OFDMA, which enable multiple users to share t

29.6.Wireless Networking and Protocols

Introduction to wireless network design, including protocol layers, network architectures, and routing protocols.

29.7.Cellular Systems and 5G

In-depth analysis of cellular network architecture, with a focus on the evolution from 1G to 5G, and future trends.

29.8..Antenna Theory and Design

Study of antenna characteristics, types, and their utilization in wireless communication systems.

29.8Wireless Security

Exploration of security challenges and solutions in wireless communications, including encryption and authentication m

29.6IoT and Wireless Sensor Networks

Examination of Internet of Things (IoT) concepts, architectures, and the role of wireless sensor networks in IoT impleme

29.1 Advanced Wireless Communications

This course explores the fundamental principles and advanced techniques of wireless communications, designed for st
technologies to prepare students for careers in the telecommunications industry.

29.2 Introduction to Wireless Communications

Overview of wireless communication systems, historical developments, and contemporary applications.

Key Topics:

- **Wireless Communication Systems:** Basic principles and components of wireless communication systems.
- **Historical Developments:** Key milestones in the evolution of wireless communications.
- **Contemporary Applications:** Current uses of wireless technology in various fields.

29.3 Radio Frequency Fundamentals

Exploration of radio frequency (RF) spectrum, key RF principles, and their application in wireless communication.

Key Topics:

- **RF Spectrum:** Understanding the RF spectrum and its allocation.
- **RF Principles:** Basics of RF communication, including modulation and demodulation.
- **Applications:** Practical uses of RF technology in wireless communication.

29.4 Wireless Signal Propagation

Understanding the behavior of wireless signals over various media and environments, including path loss, fading, and in

Key Topics:

- **Signal Propagation:** How wireless signals travel through different media.
- **Path Loss:** Factors affecting the attenuation of signal strength.
- **Fading and Interference:** Understanding and mitigating fading and interference effects.

29.5 Multiple Access Techniques

Survey of multiple access schemes including FDMA, TDMA, CDMA, and OFDMA, which enable multiple users to share th

Key Topics:

- **FDMA (Frequency Division Multiple Access):** Assigning different frequency bands to multiple users.
- **TDMA (Time Division Multiple Access):** Allocating time slots to multiple users on the same frequency.
- **CDMA (Code Division Multiple Access):** Using unique codes to differentiate users sharing the same frequ
- **OFDMA (Orthogonal Frequency Division Multiple Access):** Combining multiple sub-carriers to improve ef

29.6 Wireless Networking and Protocols

Introduction to wireless network design, including protocol layers, network architectures, and routing protocols.

Key Topics:

- **Protocol Layers:** Understanding the different layers in wireless communication protocols.
- **Network Architectures:** Designing and implementing wireless network architectures.
- **Routing Protocols:** Overview of routing protocols used in wireless networks.

29.7 Cellular Systems and 5G

In-depth analysis of cellular network architecture, with a focus on the evolution from 1G to 5G, and future trends.

Key Topics:

- **Cellular Network Architecture:** Structure and components of cellular networks.
- **1G to 5G Evolution:** Historical progression and key features of each generation.
- **Future Trends:** Emerging technologies and advancements in cellular communications.

29.8 Antenna Theory and Design

Study of antenna characteristics, types, and their utilization in wireless communication systems.

Key Topics:

- **Antenna Characteristics:** Key parameters and performance metrics of antennas.
- **Types of Antennas:** Different types of antennas used in wireless communication.
- **Design and Utilization:** Designing and deploying antennas for optimal performance.

29.9 Wireless Security

Exploration of security challenges and solutions in wireless communications, including encryption and authentication m

Key Topics:

- **Security Challenges:** Identifying common security threats in wireless communication.
- **Encryption:** Techniques for securing wireless communication through encryption.
- **Authentication:** Methods for verifying the identity of users and devices.

29.10 IoT and Wireless Sensor Networks

Examination of Internet of Things (IoT) concepts, architectures, and the role of wireless sensor networks in IoT implem

Key Topics:

- **IoT Concepts:** Understanding the basic principles and applications of IoT.
- **Architectures:** Designing IoT systems and integrating wireless sensor networks.
- **Wireless Sensor Networks:** Deploying and managing sensor networks for IoT applications.

These courses provide a comprehensive understanding of advanced wireless communications, equipping students with

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30 topics

4.1 .12.15.30.1.Advanced Electrical Engineering in Construction and Civil Engineering

This course provides an in-depth understanding of electrical engineering principles and their applications in constructio the challenges of implementing sustainable energy solutions, and the latest technologies in the field. Emphasis is place

30.2. Fundamentals of Electrical Systems in Construction

Overview of electrical systems essential in construction projects, including power distribution, lighting, and wiring syste

30.3.Electrical Safety Standards and Codes

Detailed study of electrical safety standards, codes, and regulations specific to construction sites.

30.4.Integration of Electrical Systems in Building Design

Techniques for integrating electrical systems with architectural and structural frameworks in buildings.

30.5Sustainable and Renewable Energy Technologies

Exploration of sustainable and renewable energy technologies applicable to construction projects.

30.6.Smart Grids and Intelligent Networks

Study of smart grid technologies and their application in modern urban infrastructure.

30.7.Electrical System Design and Simulation

Practical approaches to the design and simulation of electrical systems for construction projects using industry-standar

30.8.Power Quality and Energy Management

Analysis of power quality issues and energy management strategies for improved efficiency.

30.9.Electrical Systems in Infrastructure Projects

Examination of the role of electrical engineering in large-scale infrastructure projects, such as transportation and water

Advanced Electrical Engineering in Construction and Civil Engineering

This course provides an in-depth understanding of electrical engineering principles and their applications in constructio the challenges of implementing sustainable energy solutions, and the latest technologies in the field. Emphasis is place

30.2 Fundamentals of Electrical Systems in Construction

Overview of electrical systems essential in construction projects, including power distribution, lighting, and wiring syste

Key Topics:

- **Power Distribution:** Understanding the design and implementation of power distribution systems.
- **Lighting Systems:** Techniques for efficient lighting design in construction projects.
- **Wiring Systems:** Best practices for wiring systems, including safety and compliance.

30.3 Electrical Safety Standards and Codes

Detailed study of electrical safety standards, codes, and regulations specific to construction sites.

Key Topics:

- **Safety Standards:** Overview of key electrical safety standards.
- **Codes and Regulations:** Understanding and complying with electrical codes and regulations.
- **Site Safety:** Implementing safety practices on construction sites to prevent electrical hazards.

30.4 Integration of Electrical Systems in Building Design

Techniques for integrating electrical systems with architectural and structural frameworks in buildings.

Key Topics:

- **System Integration:** Strategies for seamlessly integrating electrical systems within building designs.
- **Coordination with Other Trades:** Ensuring coordination between electrical systems and other constructio
- **Design Optimization:** Techniques for optimizing electrical designs for efficiency and performance.

30.5 Sustainable and Renewable Energy Technologies

Exploration of sustainable and renewable energy technologies applicable to construction projects.

Key Topics:

- **Solar Energy:** Implementation of solar panels and photovoltaic systems in construction.

- **Wind Energy:** Integrating wind turbines and other wind energy systems.

- **Energy Storage:** Utilizing energy storage solutions such as batteries and thermal storage.

30.6 Smart Grids and Intelligent Networks

Study of smart grid technologies and their application in modern urban infrastructure.

Key Topics:

- **Smart Grid Technologies:** Understanding the components and benefits of smart grids.

- **Intelligent Networks:** Designing and managing intelligent networks for energy distribution.

- **Urban Infrastructure:** Applying smart grid technologies to modern urban infrastructure projects.

30.7 Electrical System Design and Simulation

Practical approaches to the design and simulation of electrical systems for construction projects using industry-standar

Key Topics:

- **Design Software:** Tools and software for electrical system design and simulation.

- **Simulation Techniques:** Methods for simulating electrical systems to predict performance.

- **Project Examples:** Case studies of electrical system design and simulation in real-world projects.

30.8 Power Quality and Energy Management

Analysis of power quality issues and energy management strategies for improved efficiency.

Key Topics:

- **Power Quality:** Identifying and addressing power quality issues such as voltage sags, harmonics, and tran

- **Energy Management:** Strategies for efficient energy management in construction projects.

- **Efficiency Improvement:** Techniques for improving the overall efficiency of electrical systems.

30.9 Electrical Systems in Infrastructure Projects

Examination of the role of electrical engineering in large-scale infrastructure projects, such as transportation and water

Key Topics:

- **Transportation Systems:** Electrical engineering applications in transportation infrastructure.

- **Water Systems:** Designing and managing electrical systems in water treatment and distribution.

- **Infrastructure Projects:** Examples of large-scale infrastructure projects and their electrical requirements.

These courses provide a comprehensive understanding of advanced electrical engineering principles and their applicati

4.1 .12.15.Electrical Systems in Construction and Civil Engineering

This master's level course is designed to bridge the fields of construction and civil engineering with electrical engineerin efficiency, and innovation in modern infrastructure.

Introduction to Electrical Systems in Construction

Overview of electrical systems integration in construction projects, considering design, installation, and maintenance.

Power Distribution in Buildings

Explore the principles and challenges of power distribution systems in modern buildings, including load assessments an

Lighting Systems and Design

Study the design and implementation of efficient lighting systems in commercial and residential buildings.

Electrical Safety Standards and Regulations

Learn about international and local electrical safety standards and regulations pertinent to construction projects.

Sustainability in Electrical Engineering

Understand sustainable practices and technologies, such as solar power and energy efficiency in construction.

Smart Buildings and IoT Integration

Examine the incorporation of smart technologies and IoT in building systems for improved energy management and au

Electrical Load Analysis and Estimation

Learn methods to analyze electrical loads and estimate demand for optimal system design.

Integration of Renewable Energy Sources

Explore the potential of integrating renewable energy sources into construction projects and urban environments.

Project Management in Electrical Engineering

Develop skills in managing electrical engineering projects within the construction industry, focusing on timelines, budge

30.1topics

4.1 .12.15.30.1.Doctorate in Specialist Engineering Infrastructure and Contractors: Electrical Engineering

This advanced course is designed for students pursuing a Doctorate degree in Specialist Engineering Infrastructure and practical skills necessary for the design, implementation, and management of electrical infrastructure projects. Student

30.2.Advanced Power System Analysis

Exploration of power flow analysis, fault analysis, and stability assessment in large-scale electrical power systems with a

30.3Renewable Energy Systems

An in-depth examination of renewable energy technology integration, focusing on wind, solar, and hydroelectric power

30.4.Electrical Infrastructure Design and Management

Comprehensive overview of electrical infrastructure planning, design methodologies, and management practices for ef

31.5.Smart Grids and IoT Applications

Study of smart grid technology, IoT applications in electrical systems, and their impact on efficiency and sustainability.

31.6..High Voltage Engineering

Analysis of high voltage engineering principles, equipment, and testing methodologies in power transmission.

31.7.Project Management in Electrical Engineering

Principles and practices of effective project management tailored to electrical engineering projects and infrastructure.

31.8Energy Policy and Ethical Considerations

Examination of energy policies, regulatory frameworks, and ethical considerations impacting electrical infrastructure pr

31.1Sustainable Electrical Engineering Practices

Strategies for incorporating sustainable practices in the planning, design, and execution of electrical engineering projec

30.1 Doctorate in Specialist Engineering Infrastructure and Contractors: Electrical Engineering

This advanced course is designed for students pursuing a Doctorate degree in Specialist Engineering Infrastructure and practical skills necessary for the design, implementation, and management of electrical infrastructure projects. Student

30.2 Advanced Power System Analysis

Exploration of power flow analysis, fault analysis, and stability assessment in large-scale electrical power systems with a

Key Topics:

- **Power Flow Analysis:** Techniques for analyzing the flow of electrical power in networks.
- **Fault Analysis:** Identifying and mitigating faults in power systems.
- **Stability Assessment:** Evaluating and ensuring the stability of power systems.

30.3 Renewable Energy Systems

An in-depth examination of renewable energy technology integration, focusing on wind, solar, and hydroelectric power

Key Topics:

- **Wind Energy:** Understanding the technology and integration of wind power systems.
- **Solar Energy:** Exploring photovoltaic systems and their applications.
- **Hydroelectric Power:** Implementing hydroelectric systems in renewable energy projects.

30.4 Electrical Infrastructure Design and Management

Comprehensive overview of electrical infrastructure planning, design methodologies, and management practices for ef

Key Topics:

- **Infrastructure Planning:** Strategies for effective electrical infrastructure planning.
- **Design Methodologies:** Best practices in designing electrical infrastructure.
- **Management Practices:** Techniques for managing and maintaining electrical systems.

31.5 Smart Grids and IoT Applications

Study of smart grid technology, IoT applications in electrical systems, and their impact on efficiency and sustainability.

Key Topics:

- **Smart Grid Technology:** Understanding the components and benefits of smart grids.
- **IoT in Electrical Systems:** Integrating IoT devices to enhance electrical system performance.
- **Efficiency and Sustainability:** Improving efficiency and sustainability through smart grid and IoT applicatic

31.6 High Voltage Engineering

Analysis of high voltage engineering principles, equipment, and testing methodologies in power transmission.

Key Topics:

- **High Voltage Principles:** Core principles of high voltage engineering.
- **Equipment:** Understanding high voltage equipment and its applications.
- **Testing Methodologies:** Techniques for testing and ensuring the reliability of high voltage systems.

31.7 Project Management in Electrical Engineering

Principles and practices of effective project management tailored to electrical engineering projects and infrastructure.

Key Topics:

- **Project Planning:** Techniques for planning electrical engineering projects.
- **Resource Management:** Managing resources effectively in electrical projects.
- **Risk Management:** Identifying and mitigating risks in project management.

31.8 Energy Policy and Ethical Considerations

Examination of energy policies, regulatory frameworks, and ethical considerations impacting electrical infrastructure pr

Key Topics:

- **Energy Policies:** Understanding policies that influence electrical engineering.
- **Regulatory Frameworks:** Complying with regulations in electrical infrastructure projects.
- **Ethical Considerations:** Addressing ethical issues in electrical engineering.

31.9 Sustainable Electrical Engineering Practices

Strategies for incorporating sustainable practices in the planning, design, and execution of electrical engineering projec

Key Topics:

- **Sustainable Design:** Principles of designing sustainable electrical systems.
- **Energy Efficiency:** Implementing energy-efficient practices in electrical engineering.
- **Environmental Impact:** Reducing the environmental impact of electrical projects.

These courses provide a comprehensive understanding of specialist engineering infrastructure and contractors with a f within the field

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Admission Ready - Completing your application - Atlantic International University

32.Topic

4.1 .12.15..32.1Clean Energy Technology: Ecotechnology Applications

This course provides an in-depth understanding of clean energy technologies with a focus on ecotechnology. It explore environmental impacts and fostering ecological balance. Students will gain expertise in evaluating and implementing cl

32.3.Introduction to Clean Energy and Ecotechnology

An overview of clean energy principles, the importance of ecotechnology, and how these fields integrate to promote su

32.4.Solar Energy Technologies

Exploration of solar energy systems, including photovoltaic and solar thermal technologies, and their applications in sus

32.5.Wind Energy Systems

Study of wind energy generation, the mechanics of wind turbines, and the potential of wind power as a clean energy so

32.6.Bioenergy and Biomass

Understanding the role of biomass in clean energy systems, including conversion technologies and sustainable biomass

32.7.Hydropower and Ocean Energy

Exploration of hydropower technologies and emerging ocean energy systems such as tidal and wave energy, focusing o

32.8.Geothermal Energy

An examination of geothermal energy technologies, their environmental implications, and their role in global clean ene

32.9.Energy Storage and Smart Grids

Understanding the role of energy storage technologies and smart grid systems in enhancing the efficiency and reliabilit

32.10.Policy and Economics of Clean Energy

Analysis of the policies and economic factors that influence clean energy adoption, with a focus on incentivizing ecotec

32.11Ecological Impact of Renewable Energy

Evaluating the ecological impacts of renewable energy projects and the methods to mitigate negative effects on the en

32.12.Future Directions in Clean Energy and Ecotechnology

Exploration of upcoming trends and innovations in clean energy and ecotechnology, including research and developme

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2.1 Clean Energy Technology: Ecotechnology Applications

This course provides an in-depth understanding of clean energy technologies with a focus on ecotechnology. It explore environmental impacts and fostering ecological balance. Students will gain expertise in evaluating and implementing cl

32.3 Introduction to Clean Energy and Ecotechnology

An overview of clean energy principles, the importance of ecotechnology, and how these fields integrate to promote su

Key Topics:

- **Clean Energy Principles:** Understanding the basic concepts of clean energy.

- **Importance of Ecotechnology:** The role of ecotechnology in achieving sustainable development.

- **Integration:** How clean energy and ecotechnology work together to promote environmental sustainabilit

32.4 Solar Energy Technologies

Exploration of solar energy systems, including photovoltaic and solar thermal technologies, and their applications in su

Key Topics:

- **Photovoltaic Systems:** Basics and applications of photovoltaic solar panels.

- **Solar Thermal Technologies:** Understanding solar thermal energy and its uses.

- **Sustainable Solutions:** Implementing solar technologies in sustainable energy projects.

32.5 Wind Energy Systems

Study of wind energy generation, the mechanics of wind turbines, and the potential of wind power as a clean energy so

Key Topics:

- **Wind Energy Generation:** Principles of generating energy from wind.

- **Wind Turbines:** Mechanics and design of wind turbines.

- **Potential and Applications:** Evaluating the potential of wind power as a renewable energy source.

32.6 Bioenergy and Biomass

Understanding the role of biomass in clean energy systems, including conversion technologies and sustainable biomass

Key Topics:

- **Biomass:** Types of biomass used in energy production.

- **Conversion Technologies:** Methods of converting biomass into usable energy.

- **Sustainable Sourcing:** Ensuring sustainable practices in sourcing biomass.

32.7 Hydropower and Ocean Energy

Exploration of hydropower technologies and emerging ocean energy systems such as tidal and wave energy, focusing o

Key Topics:

- **Hydropower Technologies:** Basics of hydropower generation.

- **Ocean Energy Systems:** Understanding tidal and wave energy technologies.

- **Ecological Impact:** Assessing the ecological effects of hydropower and ocean energy projects.

32.8 Geothermal Energy

An examination of geothermal energy technologies, their environmental implications, and their role in global clean ene

Key Topics:

- **Geothermal Technologies:** Basics of geothermal energy production.

- **Environmental Implications:** Understanding the impact of geothermal energy on the environment.

- **Global Strategies:** Role of geothermal energy in worldwide clean energy initiatives.

32.9 Energy Storage and Smart Grids

Understanding the role of energy storage technologies and smart grid systems in enhancing the efficiency and reliabilit

Key Topics:

- **Energy Storage Technologies:** Exploring different types of energy storage solutions.

- **Smart Grids:** Basics of smart grid technology and its benefits.

- **Efficiency and Reliability:** Improving energy distribution through advanced storage and smart grid system

32.10 Policy and Economics of Clean Energy

Analysis of the policies and economic factors that influence clean energy adoption, with a focus on incentivizing ecotec

Key Topics:

- **Clean Energy Policies:** Understanding the policy landscape for clean energy.

- **Economic Factors:** Evaluating the economic benefits and challenges of clean energy adoption.

- **Incentives:** Exploring incentives and support mechanisms for ecotechnology innovations.

32.11 Ecological Impact of Renewable Energy

Evaluating the ecological impacts of renewable energy projects and the methods to mitigate negative effects on the en

Key Topics:

- **Impact Assessment:** Techniques for assessing the ecological impact of renewable energy projects.

- **Mitigation Strategies:** Methods to reduce the environmental impact of clean energy systems.

- **Best Practices:** Implementing best practices for ecological sustainability in renewable energy.

32.12 Future Directions in Clean Energy and Ecotechnology

Exploration of upcoming trends and innovations in clean energy and ecotechnology, including research and developme

Key Topics:

- **Emerging Trends:** Identifying new trends and innovations in clean energy and ecotechnology.
- **Research and Development:** Current and future research initiatives in the field.
- **Future Prospects:** Predicting future directions and advancements in clean energy and ecotechnology.

These courses provide a comprehensive understanding of clean energy technology and ecotechnology applications, eq

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33.Topics

4.1 .12.15.33.1Integration of Electronic Engineering in Construction and Civil Engineering

This course aims to explore the integration of electronic engineering principles within the domains of construction and smart infrastructure, and sustainable development. Students will gain interdisciplinary knowledge and practical skills to

33.2.Introduction to Electronic Systems in Civil Engineering

This topic provides an overview of the role and importance of electronic systems in the construction and civil engineeri

33.3.Smart Construction Technologies

Exploring various smart construction technologies enabled by electronic systems such as sensors, IoT devices, and auto

33.4.IoT in Infrastructure Management

Understanding how IoT devices are used in managing and monitoring infrastructure and civil engineering projects.

33.5.Electronic Monitoring and Control Systems

This topic covers the usage of electronic systems for monitoring and control within large-scale construction projects.

33.6.Automation in Construction Machinery

Explore how electronic engineering drives the automation of construction machinery for enhanced efficiency and preci

33.7.Solar and Renewable Energy Systems in Civil Engineering

Investigate how electronic engineering aids in integrating solar and renewable energy systems into modern civil engine

33.8.Building Information Modeling (BIM) and Electronic Systems

Understand the role of electronic systems in enhancing Building Information Modeling processes.

33.9.Cybersecurity in Smart Infrastructure

Learn about the importance of cybersecurity systems to protect smart civil infrastructure from digital threats.

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33.1 Integration of Electronic Engineering in Construction and Civil Engineering

This course aims to explore the integration of electronic engineering principles within the domains of construction and smart infrastructure, and sustainable development. Students will gain interdisciplinary knowledge and practical skills to

33.2 Introduction to Electronic Systems in Civil Engineering

This topic provides an overview of the role and importance of electronic systems in the construction and civil engineeri

Key Topics:

- **Role and Importance:** Understanding how electronic systems are essential in modern construction and ci
- **Applications:** Examples of electronic systems used in these industries.
- **Technological Integration:** How electronic engineering is integrated into construction projects.

33.3 Smart Construction Technologies

Exploring various smart construction technologies enabled by electronic systems such as sensors, IoT devices, and auto

Key Topics:

- **Sensors:** Use of sensors for real-time monitoring and data collection.
- **IoT Devices:** Implementing IoT devices to create connected construction sites.
- **Automation:** Enhancing construction processes through automation technologies.

33.4 IoT in Infrastructure Management

Understanding how IoT devices are used in managing and monitoring infrastructure and civil engineering projects.

Key Topics:

- **IoT Devices:** Types and functions of IoT devices in infrastructure management.
- **Monitoring:** Techniques for using IoT to monitor infrastructure health and performance.

- **Management:** Strategies for managing infrastructure projects using IoT technologies.

33.5 Electronic Monitoring and Control Systems

This topic covers the usage of electronic systems for monitoring and control within large-scale construction projects.

Key Topics:

- **Monitoring Systems:** Implementing electronic systems to monitor construction activities.
- **Control Systems:** Using electronic control systems to manage construction processes.
- **Large-Scale Projects:** Examples of electronic monitoring and control in large construction projects.

33.6 Automation in Construction Machinery

Explore how electronic engineering drives the automation of construction machinery for enhanced efficiency and preci

Key Topics:

- **Construction Machinery:** Types of machinery that can be automated.
- **Efficiency and Precision:** Benefits of automation in construction machinery.
- **Technology Integration:** How electronic engineering enables automation in construction equipment.

33.7 Solar and Renewable Energy Systems in Civil Engineering

Investigate how electronic engineering aids in integrating solar and renewable energy systems into modern civil engine

Key Topics:

- **Solar Energy Systems:** Design and integration of solar energy solutions.
- **Renewable Energy:** Incorporating various renewable energy sources in civil engineering.
- **Sustainability:** Promoting sustainable development through renewable energy systems.

33.8 Building Information Modeling (BIM) and Electronic Systems

Understand the role of electronic systems in enhancing Building Information Modeling processes.

Key Topics:

- **BIM Technology:** Basics and benefits of Building Information Modeling.
- **Electronic Integration:** How electronic systems improve BIM processes.
- **Efficiency and Collaboration:** Enhancing project efficiency and collaboration through BIM.

33.9 Cybersecurity in Smart Infrastructure

Learn about the importance of cybersecurity systems in protecting smart infrastructure from cyber threats.

Key Topics:

- **Cybersecurity Principles:** Understanding the basics of cybersecurity.
- **Smart Infrastructure:** Identifying vulnerabilities in smart infrastructure systems.
- **Protection Strategies:** Implementing cybersecurity measures to protect smart infrastructure.

These courses provide a comprehensive understanding of how electronic engineering can be integrated into constructi electronic solution

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34.1.Topic

4.1 .12.15..34.2.Masters in Immutable Data Storage Solutions for Web Design

This course provides an advanced understanding of immutable data storage solutions specifically tailored for web desig practices in the context of developing modern, resilient web applications.

34.3.Introduction to Immutable Data

An overview of immutable data, its importance in web design, and basic concepts such as data structures and potential

33.4.Immutable Data Structures

Discussion on various immutable data structures such as lists, sets, and maps. Understanding their use and advantages

33.5.Immutable.js and Alternatives

An examination of popular libraries like Immutable.js and other alternatives that offer immutable data structures in Jav

33.6.State Management with Immutable Data

Exploring how immutable data can simplify state management in web applications, with a focus on integrating with pop

33.7.Performance Benefits of Immutable Data

Investigating the performance benefits that immutable data can bring to web applications and how these benefits can

33.8.GraphQL and Immutable Data

Integrating immutable data with GraphQL endpoints and understanding the implications for web application design.

33.9.Immutable Data in Server-Side Rendering (SSR)

Utilizing immutable data in server-side rendering processes to boost performance and maintain data consistency.

33.10.Security and Immutable Data

Understanding security concerns and best practices when implementing immutable data storage solutions in web appl

33.11.Future Trends in Immutable Data

Exploring future trends and developments in immutable data storage solutions and how they might impact web design

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Masters in Immutable Data Storage Solutions for Web Design

This course provides an advanced understanding of immutable data storage solutions specifically tailored for web desig practices in the context of developing modern, resilient web applications.

34.2 Introduction to Immutable Data

An overview of immutable data, its importance in web design, and basic concepts such as data structures and potential

Key Topics:

- **Basics of Immutable Data:** Understanding what immutable data is and why it's important.
- **Data Structures:** Exploring the types of data structures used in immutable data.
- **Benefits:** Identifying the potential benefits of using immutable data in web design.

34.3 Immutable Data Structures

Discussion on various immutable data structures such as lists, sets, and maps. Understanding their use and advantages

Key Topics:

- **Lists:** Using immutable lists and their advantages.
- **Sets:** Implementing immutable sets for unique data storage.
- **Maps:** Exploring the use of immutable maps and their benefits.

34.Topic

4.1 .12.15.34.1.Masters in Immutable Data Storage Solutions for Web Design

This course provides an advanced understanding of immutable data storage solutions specifically tailored for web desig practices in the context of developing modern, resilient web applications.

34.2.Introduction to Immutable Data

An overview of immutable data, its importance in web design, and basic concepts such as data structures and potential

34.3.Immutable Data Structures

Discussion on various immutable data structures such as lists, sets, and maps. Understanding their use and advantages

34.4.Immutable.js and Alternatives

An examination of popular libraries like Immutable.js and other alternatives that offer immutable data structures in Jav

34.5.State Management with Immutable Data

Exploring how immutable data can simplify state management in web applications, with a focus on integrating with pop

34.6.Performance Benefits of Immutable Data

Investigating the performance benefits that immutable data can bring to web applications and how these benefits can

34.6.GraphQL and Immutable Data

Integrating immutable data with GraphQL endpoints and understanding the implications for web application design.

34.7.Immutable Data in Server-Side Rendering (SSR)

Utilizing immutable data in server-side rendering processes to boost performance and maintain data consistency.

34.8.Security and Immutable Data

Understanding security concerns and best practices when implementing immutable data storage solutions in web appl

34.9.Future Trends in Immutable Data

Exploring future trends and developments in immutable data storage solutions and how they might impact web design

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34.1 Masters in Immutable Data Storage Solutions for Web Design

This course provides an advanced understanding of immutable data storage solutions specifically tailored for web desig practices in the context of developing modern, resilient web applications.

34.2 Introduction to Immutable Data

An overview of immutable data, its importance in web design, and basic concepts such as data structures and potential

Key Topics:

- **Basics of Immutable Data:** Understanding what immutable data is and why it's important.
- **Data Structures:** Exploring the types of data structures used in immutable data.

- **Benefits:** Identifying the potential benefits of using immutable data in web design.

34.3 Immutable Data Structures

Discussion on various immutable data structures such as lists, sets, and maps. Understanding their use and advantages

Key Topics:

- **Lists:** Using immutable lists and their advantages.
- **Sets:** Implementing immutable sets for unique data storage.
- **Maps:** Exploring the use of immutable maps and their benefits.

35.1.Topic

4.1 .12.15..35.2.Advanced Cyber-Physical Systems in Telecommunications

This course explores the intersection of cyber-physical systems and telecommunications, providing an in-depth underst
design, and implementation of next-generation telecommunication systems using cyber-physical components, with a k

35.3.Introduction to Cyber-Physical Systems

Understand the core concepts and significance of cyber-physical systems (CPS) in the modern world, particularly in the

35.4.Network Architecture in CPS

Study the architectural principles of integrating CPS with telecommunication networks, including topologies, network p

35.5..IoT and Cyber-Physical Systems

Explore the role of the Internet of Things (IoT) as a component of CPS, focusing on its application in telecommunication

35.6.Security and Privacy in CPS

Examine security challenges and privacy concerns in CPS, particularly how these affect telecommunication systems.

35.7.Real-time Data Processing and Analytics

Learn about the techniques and technologies used for real-time data processing and analytics in the context of CPS and

35.8.Machine Learning in Cyber-Physical Systems

Understand how machine learning can be applied to optimize and innovate CPS within tele----------communications.

35.9.Emerging Trends in CPS and Telecommunications

Discover the latest research and technological trends shaping the future of CPS in the telecom sector.

35.10.CPS Case Studies in Telecommunications

Analyze real-world case studies where CPS has been effectively integrated into telecommunications systems.

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35.2 Advanced Cyber-Physical Systems in Telecommunications

This course explores the intersection of cyber-physical systems and telecommunications, providing an in-depth underst
design, and implementation of next-generation telecommunication systems using cyber-physical components, with a k

35.3 Introduction to Cyber-Physical Systems

Understand the core concepts and significance of cyber-physical systems (CPS) in the modern world, particularly in the

Key Topics:

- **Core Concepts:** Basics of CPS and their importance in modern technology.
- **Significance:** Understanding why CPS are crucial in telecommunications.
- **Applications:** Various applications of CPS in different sectors.

35.4 Network Architecture in CPS

Study the architectural principles of integrating CPS with telecommunication networks, including topologies, network p

Key Topics:

- **Architectural Principles:** Fundamentals of network architecture in CPS.
- **Topologies:** Different types of network topologies used in CPS.
- **Network Protocols:** Understanding network protocols for CPS integration.
- **Infrastructure:** Building and managing CPS infrastructure in telecommunications.

35.5 IoT and Cyber-Physical Systems

Explore the role of the Internet of Things (IoT) as a component of CPS, focusing on its application in telecommunicatior

Key Topics:

- **IoT Basics:** Understanding the fundamentals of IoT.
- **IoT in CPS:** How IoT devices integrate with CPS.
- **Applications in Telecommunications:** Using IoT for enhancing telecommunications systems.

35.6 Security and Privacy in CPS

Examine security challenges and privacy concerns in CPS, particularly how these affect telecommunication systems.

Key Topics:

- **Security Challenges:** Identifying and addressing security issues in CPS.
- **Privacy Concerns:** Ensuring data privacy in CPS applications.
- **Impact on Telecommunications:** Understanding how security and privacy issues affect telecom systems.

35.7 Real-time Data Processing and Analytics

Learn about the techniques and technologies used for real-time data processing and analytics in the context of CPS and

Key Topics:

- **Real-time Processing:** Techniques for real-time data processing in CPS.
- **Analytics:** Using analytics to gain insights from CPS data.
- **Technologies:** Tools and technologies for real-time data processing and analytics.

35.8 Machine Learning in Cyber-Physical Systems

Understand how machine learning can be applied to optimize and innovate CPS within telecommunications.

Key Topics:

- **Machine Learning Basics:** Introduction to machine learning concepts.
- **Applications in CPS:** How machine learning enhances CPS functionality.
- **Telecommunications:** Using machine learning for innovative solutions in telecom systems.

35.9 Emerging Trends in CPS and Telecommunications

Discover the latest research and technological trends shaping the future of CPS in the telecom sector.

Key Topics:

- **Research Developments:** Latest research in CPS and telecommunications.
- **Technological Trends:** Emerging technologies impacting CPS.
- **Future Prospects:** Predicting the future of CPS in the telecommunications industry.

35.10 CPS Case Studies in Telecommunications

Analyze real-world case studies where CPS has been effectively integrated into telecommunications systems.

Key Topics:

- **Case Studies:** Detailed analysis of successful CPS implementations.
- **Integration Strategies:** Understanding strategies for integrating CPS in telecom systems.
- **Lessons Learned:** Key takeaways from real-world CPS applications in telecommunications.

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36. Topics:

37. Master's Program in Artificial Intelligence and Machine Learning for Software Engineering

This course provides an in-depth exploration of artificial intelligence and machine learning within the context of softwa
solutions efficiently within software applications. The course covers fundamental concepts, advanced techniques, and

4.1 .12.15..36.1.Introduction to Artificial Intelligence and Machine Learning

This topic covers the fundamental concepts, history, and evolution of AI and ML, providing a basis for understanding ho

36.2.Data Preprocessing and Feature Engineering

This module focuses on preparing data for machine learning models, involving data cleaning, normalization, and transfo

36.3.Supervised Learning Techniques

Discover various supervised learning algorithms such as regression, decision trees, and neural networks, and learn how

36.4.Unsupervised Learning and Clustering

Explore unsupervised learning methods, including clustering and dimensionality reduction, which are essential for extra

36.5.Deep Learning and Neural Networks

This topic delves into the structure and function of neural networks, focusing on deep learning techniques crucial for a

36.6.Natural Language Processing

Gain an understanding of techniques to process and analyze human language data, facilitating the creation of AI-driven

36.7.AI/ML in Software Development Lifecycle

Learn how AI and ML can be integrated into different stages of software development, from requirement gathering to

36.8.Ethical and Responsible AI

Address the ethical considerations and responsibilities in AI, focusing on issues such as bias,

36.8.Deployment and Scaling of AI Solutions

Learn the practical considerations and challenges of deploying and scaling AI/ML solutions in production environments,

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37.1 Master's Program in Artificial Intelligence and Machine Learning for Software Engineering

This course provides an in-depth exploration of artificial intelligence and machine learning within the context of softwa
solutions efficiently within software applications. The course covers fundamental concepts, advanced techniques, and

37.2 Introduction to Artificial Intelligence and Machine Learning

This topic covers the fundamental concepts, history, and evolution of AI and ML, providing a basis for understanding ho

Key Topics:

- **Fundamental Concepts:** Basics of AI and ML, including key definitions and principles.
- **History and Evolution:** Tracing the development of AI and ML over time.
- **Impact on Software Engineering:** Understanding how AI and ML are transforming the field of software en

37.3 Data Preprocessing and Feature Engineering

This module focuses on preparing data for machine learning models, involving data cleaning, normalization, and transfo

Key Topics:

- **Data Cleaning:** Techniques for handling missing values, outliers, and inconsistencies in data.
- **Normalization and Transformation:** Methods for scaling and transforming data for better model perform
- **Feature Engineering:** Creating and selecting relevant features to enhance model accuracy.

37.4 Supervised Learning Techniques

Discover various supervised learning algorithms such as regression, decision trees, and neural networks, and learn how

Key Topics:

- **Regression:** Linear and logistic regression techniques.
- **Decision Trees:** Understanding how decision trees work and their applications.

- **Neural Networks:** Basics of neural networks and how they can be used in supervised learning.

37.5 Unsupervised Learning and Clustering

Explore unsupervised learning methods, including clustering and dimensionality reduction, which are essential for extra

Key Topics:

- **Clustering:** Techniques such as K-means, hierarchical clustering, and DBSCAN.
- **Dimensionality Reduction:** Methods like PCA (Principal Component Analysis) and t-SNE.
- **Applications:** Real-world applications of unsupervised learning in software systems.

37.6 Deep Learning and Neural Networks

This topic delves into the structure and function of neural networks, focusing on deep learning techniques crucial for a

Key Topics:

- **Deep Learning:** Understanding deep learning architectures like CNNs (Convolutional Neural Networks) ar
- **Neural Network Structures:** Layers, activation functions, and backpropagation.
- **Advanced Techniques:** Exploring advanced topics such as transfer learning and generative adversarial ne

37.7 Natural Language Processing

Gain an understanding of techniques to process and analyze human language data, facilitating the creation of AI-driver

Key Topics:

- **Text Preprocessing:** Techniques for tokenization, stemming, and lemmatization.
- **NLP Models:** Understanding models like Word2Vec, BERT, and GPT.
- **Applications:** Implementing NLP in chatbots, sentiment analysis, and other applications.

37.8 AI/ML in Software Development Lifecycle

Learn how AI and ML can be integrated into different stages of software development, from requirement gathering to

Key Topics:

- **Requirement Gathering:** Using AI for requirement analysis and specification.
- **Development:** Incorporating AI/ML algorithms into software development processes.
- **Testing:** Automated testing and bug detection using AI.

- **Deployment:** Best practices for deploying AI/ML solutions in production environments.

37.9 Ethical and Responsible AI

Address the ethical considerations and responsibilities in AI, focusing on issues such as bias, transparency, and account

Key Topics:

- **Bias and Fairness:** Identifying and mitigating biases in AI models.
- **Transparency:** Ensuring transparency in AI decision-making processes.
- **Accountability:** Establishing accountability for AI outcomes and decisions.

37.10 Deployment and Scaling of AI Solutions

Learn the practical considerations and challenges of deploying and scaling AI/ML solutions in production environments.

Key Topics:

- **Deployment Challenges:** Overcoming challenges in deploying AI solutions.
- **Scaling Techniques:** Techniques for scaling AI/ML models to handle large volumes of data.
- **Performance Monitoring:** Ensuring ongoing performance and reliability of AI solutions.

These courses provide a comprehensive understanding of artificial intelligence and machine learning for software engi

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37..Topics:

4.1 .12.15.37.1.Advanced Studies in Autonomous Vehicles and Drones for Electric Vehicle Engineering

This course provides an in-depth exploration of the engineering principles and technological innovations driving autono
between hardware design, software development, and system integration to equip students with the skills to design, te

37.1.Introduction to Autonomous Systems

An overview of autonomous vehicle and drone technologies, including historical development and future trends.

37.2Electric Vehicle Engineering Basics

Foundational concepts of electric vehicle engineering, including battery technology and electric motor design.

37.3.Sensor Technologies and Data Processing

Understanding the sensors used in autonomous systems, including LIDAR, RADAR, and cameras, as well as data process

37.4.Machine Learning and AI for Autonomous Systems

Exploration of machine learning and artificial intelligence applications in autonomous decision-making and navigation.

37.5.Communication Networks and IoT

Study of communication networks and the role of IoT in connecting autonomous vehicles and drones.

37.6.Control Systems for Autonomous Vehicles

Examination of control systems used for vehicle dynamics and operational management in autonomous vehicles.

37.7Ethical and Regulatory Aspects

Discussion on the ethical implications and regulatory challenges associated with the deployment of autonomous vehicl

37.8.Testing and Validation of Autonomous Systems

Processes involved in testing and validation methodologies to ensure the safety and reliability of autonomous systems.

37.9.Integration of Renewable Energy in Autonomous Systems

Integration of renewable energy sources like solar and wind power into autonomous systems to enhance sustainability

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37.1 Advanced Studies in Autonomous Vehicles and Drones for Electric Vehicle Engineering

This course provides an in-depth exploration of the engineering principles and technological innovations driving autono
between hardware design, software development, and system integration to equip students with the skills to design, te

37.2 Introduction to Autonomous Systems

An overview of autonomous vehicle and drone technologies, including historical development and future trends.

Key Topics:

- **Historical Development:** Tracing the evolution of autonomous systems from inception to present day.
- **Technologies:** Key technologies driving autonomous vehicles and drones.
- **Future Trends:** Predicting the future advancements and trends in autonomous systems.

37.3 Electric Vehicle Engineering Basics

Foundational concepts of electric vehicle engineering, including battery technology and electric motor design.

Key Topics:

- **Battery Technology:** Understanding the types, design, and performance of batteries used in electric vehic
- **Electric Motor Design:** Basics of electric motor functionality and design.

- **Charging Systems:** Overview of charging infrastructure and technologies.

37.4 Sensor Technologies and Data Processing

Understanding the sensors used in autonomous systems, including LIDAR, RADAR, and cameras, as well as data process

Key Topics:

- **LIDAR and RADAR:** Functionality and applications in autonomous systems.
- **Cameras and Imaging:** Role of cameras in autonomous navigation and obstacle detection.
- **Data Processing Algorithms:** Techniques for processing and analyzing sensor data.

37.5 Machine Learning and AI for Autonomous Systems

Exploration of machine learning and artificial intelligence applications in autonomous decision-making and navigation.

Key Topics:

- **Machine Learning:** Applying ML algorithms for autonomous systems.
- **AI Decision-Making:** Implementing AI for navigation and obstacle avoidance.
- **Real-World Applications:** Case studies of AI and ML in autonomous vehicles and drones.

37.6 Communication Networks and IoT

Study of communication networks and the role of IoT in connecting autonomous vehicles and drones.

Key Topics:

- **Communication Protocols:** Understanding the protocols used in autonomous vehicle networks.
- **IoT Integration:** How IoT devices enhance connectivity in autonomous systems.
- **Network Security:** Ensuring secure communication in autonomous networks.

37.7 Control Systems for Autonomous Vehicles

Examination of control systems used for vehicle dynamics and operational management in autonomous vehicles.

Key Topics:

- **Vehicle Dynamics:** Basics of vehicle control and dynamics.
- **Control Algorithms:** Algorithms used for maintaining stability and control.

- **Operational Management:** Managing the operations of autonomous systems.

37.8 Ethical and Regulatory Aspects

Discussion on the ethical implications and regulatory challenges associated with the deployment of autonomous vehicl

Key Topics:

- **Ethical Considerations:** Addressing the ethical issues in autonomous system deployment.
- **Regulatory Frameworks:** Understanding the regulations governing autonomous vehicles and drones.
- **Compliance:** Ensuring compliance with legal and ethical standards.

37.9 Testing and Validation of Autonomous Systems

Processes involved in testing and validation methodologies to ensure the safety and reliability of autonomous systems.

Key Topics:

- **Testing Methodologies:** Techniques for testing autonomous systems.
- **Validation Processes:** Ensuring the reliability and safety of autonomous vehicles.
- **Case Studies:** Real-world examples of testing and validation.

37.10 Integration of Renewable Energy in Autonomous Systems

Investigating how renewable energy sources can be integrated into autonomous vehicles and drones to enhance susta

Key Topics:

- **Renewable Energy Sources:** Types of renewable energy used in autonomous systems.
- **Integration Techniques:** Methods for integrating renewable energy into vehicle design.
- **Sustainability:** Promoting sustainable practices in autonomous vehicle engineering

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38.1.topics

4.1 .12.15.38.2:Specialist Engineering in Infrastructure and Contractors: Electrochemical Engineering

This Master's degree course offers in-depth knowledge in electrochemical engineering within the realm of infrastructu tackle complex engineering projects involving electrochemical systems. From battery technologies to electrochemical p

38.3.Introduction to Electrochemical Engineering

Understand the basic principles of electrochemistry, including thermodynamics and kinetics, electron transfer processe

38.4.Battery Technologies for Infrastructure

Explore the various types of battery technologies used in infrastructure, including lithium-ion, lead-acid, and emerging

38.5.Fuel Cells and Their Applications

Study the principles and applications of different types of fuel cells, focusing on their role in providing clean energy for

38.6.and Its Prevention

Learn about the electrochemical processes involved in corrosion, methods of prevention, and materials selection to en

38.7..Electrochemical Sensors and Monitoring

Understand the design and function of electrochemical sensors in monitoring environmental conditions and structural

38.8.Electrolysis and Industrial Processes

Explore how electrolysis is used in various industrial processes, such as water splitting for hydrogen production and me

38.9.Sustainability and Electrochemical Engineering

Discuss the impact of electrochemical engineering on sustainable infrastructure development and the environment.

.38.10.Advanced Topics in Electrochemical Engineering

Delve into advanced topics and current research trends in electrochemical engineering, such as nanostructured materi

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38.2 Specialist Engineering in Infrastructure and Contractors: Electrochemical Engineering

This Master's degree course offers in-depth knowledge in electrochemical engineering within the realm of infrastructu
tackle complex engineering projects involving electrochemical systems. From battery technologies to electrochemical p

38.3 Introduction to Electrochemical Engineering

Understand the basic principles of electrochemistry, including thermodynamics and kinetics, electron transfer processe

Key Topics:

- **Thermodynamics and Kinetics:** Fundamental principles governing electrochemical reactions.
- **Electron Transfer Processes:** Mechanisms of electron transfer in electrochemical systems.
- **System Design and Operation:** Designing and operating efficient electrochemical systems.

38.4 Battery Technologies for Infrastructure

Explore the various types of battery technologies used in infrastructure, including lithium-ion, lead-acid, and emerging

Key Topics:

- **Lithium-ion Batteries:** Structure, function, and applications.
- **Lead-acid Batteries:** Traditional uses and modern improvements.
- **Emerging Technologies:** Exploring the potential of solid-state and other advanced battery technologies.

38.5 Fuel Cells and Their Applications

Study the principles and applications of different types of fuel cells, focusing on their role in providing clean energy for

Key Topics:

- **Types of Fuel Cells:** Proton exchange membrane (PEM), solid oxide (SOFC), and others.
- **Clean Energy Production:** How fuel cells contribute to sustainable energy solutions.
- **Infrastructure Applications:** Real-world applications of fuel cells in infrastructure projects.

38.6 Corrosion and Its Prevention

Learn about the electrochemical processes involved in corrosion, methods of prevention, and materials selection to en

Key Topics:

- **Corrosion Mechanisms:** Understanding how and why corrosion occurs.
- **Prevention Methods:** Techniques to prevent and control corrosion.
- **Materials Selection:** Choosing materials to enhance durability and prevent corrosion.

38.7 Electrochemical Sensors and Monitoring

Understand the design and function of electrochemical sensors in monitoring environmental conditions and structural

Key Topics:

- **Sensor Design:** Principles of designing effective electrochemical sensors.
- **Environmental Monitoring:** Using sensors to monitor environmental conditions.
- **Structural Health Monitoring:** Applications in assessing the health and integrity of infrastructure.

38.8 Electrolysis and Industrial Processes

Explore how electrolysis is used in various industrial processes, such as water splitting for hydrogen production and me

Key Topics:

- **Electrolysis Basics:** Understanding the principles of electrolysis.

- **Hydrogen Production:** Using electrolysis for sustainable hydrogen generation.

- **Industrial Applications:** Applying electrolysis in metal plating and other industrial processes.

38.9 Sustainability and Electrochemical Engineering

Discuss the impact of electrochemical engineering on sustainable infrastructure development and the environment.

Key Topics:

- **Sustainability Principles:** Integrating sustainability into electrochemical engineering practices.

- **Environmental Impact:** Assessing and mitigating the environmental impact of electrochemical processes.

- **Sustainable Development:** Promoting sustainable infrastructure through innovative electrochemical solu

38.10 Advanced Topics in Electrochemical Engineering

Delve into advanced topics and current research trends in electrochemical engineering, such as nanostructured materi

Key Topics:

- **Nanostructured Materials:** Exploring the role of nanotechnology in electrochemical engineering.

- **Next-Generation Energy Systems:** Innovations in energy systems for sustainable infrastructure.

- **Current Research Trends:** Investigating the latest advancements and research in the field.

These courses provide a comprehensive understanding of electrochemical engineering in infrastructure and contractor developme

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40.Topics

4.1 .12.15..40.1Topics:Energy Storage and Battery Technology

This course explores advanced concepts in energy storage with a focus on battery technologies, essential for the integr their applications, and the technological advancements driving the sector. The course is designed for graduate student

40.2.Introduction to Energy Storage Systems

An overview of energy storage technologies and their importance in the modern energy landscape.

40.3.Battery Chemistry and Physics

Understanding the fundamental principles of various battery chemistries, including lithium-ion, lead-acid, and emergin

40.4.Design and Functionality of Battery Cells

Exploration of the design and operational principles of individual battery cells, and how they combine to form larger ba

40.5.Applications of Battery Storage

Examine how battery storage is used in various sectors such as electric vehicles, grid storage, and portable electronics.

40.6.Efficiency and Performance Measurements

Learn about the metrics used to measure the performance and efficiency of battery systems.

40.7.Safety and Environmental Impacts

Discussion of the safety protocols for batteries and their environmental impact, including recycling and waste manager

40.8.Advanced Energy Storage Technologies

Explore cutting-edge advancements in energy storage beyond current battery technology, such as supercapacitors and

40.9.Policy and Economics of Energy Storage

Examine the economic impacts, policy considerations, and market dynamics of implementing energy storage solutions.

40.10.Future Trends in Battery Technology

Insights into the future direction of battery technology research and its role in achieving a sustainable energy future.

41.1.Topics:

41.2.Advanced Robotic Process Automation in Electrical Engineering

This course aims to equip students with advanced knowledge and practical skills in implementing Robotic Process Auto to streamline and optimize engineering processes, focusing on automating complex electrical engineering tasks.

41.3.Introduction to Robotic Process Automation

An overview of RPA, its significance in the industry, and its application in electrical engineering.

41.4.RPA Tools and Technologies

Explore popular RPA tools like UiPath, Automation Anywhere, and Blue Prism and their specific applications in engineer

41.5.Automating Electrical Design Processes

Learn how to automate repetitive tasks in electrical design using RPA to increase efficiency and reduce human error.

41.6.Data Migration and Management

Understanding the role of RPA in handling data migration and management in electrical engineering projects.

41.7.RPA in Control Systems

Applications of RPA in the automation of control systems and simulation processes within electrical engineering.

41.8.Machine Learning and RPA

Integrating machine learning with RPA for enhanced decision-making and predictive maintenance in electrical engineer

41.9.RPA and IoT in Electrical Systems

Exploring the synergy between RPA and IoT to develop smart electrical systems with improved functionality and efficie

41.10.Security and Ethics in RPA

Understanding the ethical considerations and security challenges associated with the deployment of RPA in electrical e

1.2 Advanced Robotic Process Automation in Electrical Engineering

This course aims to equip students with advanced knowledge and practical skills in implementing Robotic Process Auto to streamline and optimize engineering processes, focusing on automating complex electrical engineering tasks.

41.3 Introduction to Robotic Process Automation

An overview of RPA, its significance in the industry, and its application in electrical engineering.

Key Topics:

- **RPA Basics:** Understanding the fundamentals of Robotic Process Automation.
- **Industry Significance:** Exploring the importance and impact of RPA in various industries.
- **Applications in Electrical Engineering:** Specific use cases and benefits of RPA in electrical engineering.

41.4 RPA Tools and Technologies

Explore popular RPA tools like UiPath, Automation Anywhere, and Blue Prism and their specific applications in engineer

Key Topics:

- **UiPath:** Features and applications of UiPath in automating engineering tasks.
- **Automation Anywhere:** Understanding how Automation Anywhere can be used in electrical engineering.
- **Blue Prism:** Exploring Blue Prism's capabilities and use cases in the industry.

41.5 Automating Electrical Design Processes

Learn how to automate repetitive tasks in electrical design using RPA to increase efficiency and reduce human error.

Key Topics:

- **Repetitive Task Automation:** Identifying and automating repetitive tasks in electrical design.

- **Efficiency Improvement:** Enhancing efficiency and productivity through automation.

- **Error Reduction:** Minimizing human errors by implementing RPA solutions.

41.6 Data Migration and Management

Understanding the role of RPA in handling data migration and management in electrical engineering projects.

Key Topics:

- **Data Migration:** Techniques for automating data migration processes.

- **Data Management:** Using RPA to manage and organize large datasets.

- **Project Applications:** Implementing RPA for data handling in engineering projects.

41.7 RPA in Control Systems

Applications of RPA in the automation of control systems and simulation processes within electrical engineering.

Key Topics:

- **Control Systems Automation:** Using RPA to automate control system processes.

- **Simulation Processes:** Enhancing simulation processes through automation.

- **Case Studies:** Real-world examples of RPA applications in control systems.

41.8 Machine Learning and RPA

Integrating machine learning with RPA for enhanced decision-making and predictive maintenance in electrical engineer

Key Topics:

- **Machine Learning Integration:** Combining ML algorithms with RPA for advanced automation.

- **Predictive Maintenance:** Using ML and RPA for proactive maintenance strategies.

- **Enhanced Decision-Making:** Improving decision-making processes through intelligent automation.

41.9 RPA and IoT in Electrical Systems

Exploring the synergy between RPA and IoT to develop smart electrical systems with improved functionality and efficie

Key Topics:

- **RPA and IoT Integration:** Understanding how RPA and IoT can work together.

- **Smart Systems:** Developing smart electrical systems using RPA and IoT.

- **Efficiency and Functionality:** Enhancing system functionality and efficiency through integration.

41.10 Security and Ethics in RPA

Understanding the ethical considerations and security challenges associated with the deployment of RPA in electrical e

Key Topics:

- **Ethical Considerations:** Addressing ethical issues in RPA implementation.
- **Security Challenges:** Identifying and mitigating security risks in RPA systems.
- **Best Practices:** Implementing best practices for secure and ethical RPA deployment.

These courses provide a comprehensive understanding of advanced robotic process automation in electrical engineerin

44…Topics grand circulum summarise resolve probme outcome exercise :

44.1 reating a comprehensive and accurate calculation formulation for a master's degree in electrical engineering typic
outline a general approach to developing a calculation formulation in the context of electrical engineering:

44..1. Define the Problem

- Clearly state the engineering problem or objective.
- Identify the variables and parameters involved.
- Determine the constraints and assumptions.

2. Develop the Mathematical Model

- Formulate the equations governing the physical system (e.g., Ohm's law, Kirchhoff's laws, Maxwell's equa
- Use appropriate mathematical techniques to model the system (e.g., differential equations, linear algebr

3. Simplify the Equations

- Apply any necessary simplifications or approximations.
- Reduce the equations to a solvable form.

4. Analytical Solution (if possible)

- Solve the equations analytically using mathematical methods.

- Check the validity of the analytical solution within the defined constraints.

5. Numerical Solution (if necessary)

- If the analytical solution is not feasible, develop a numerical solution.

- Use numerical methods (e.g., finite element method, numerical integration).

6. Simulation and Validation

- Implement the model in simulation software (e.g., MATLAB, Simulink).

- Validate the results with experimental data or known benchmarks.

7. Optimization (if applicable)

- Optimize the solution for desired performance criteria (e.g., efficiency, cost).

- Use optimization techniques (e.g., genetic algorithms, gradient descent).

Example Calculation: Load Flow Analysis in Power Systems

Here's a simplified example of a calculation formulation for load flow analysis in power systems:

Step 1: Define the Problem

- Objective: Determine the voltage and phase angle at each bus in the power system.

- Variables: Bus voltages (V), phase angles (θ), real power (P), reactive power (Q).

- Constraints: Power balance equations, voltage limits.

Step 2: Develop the Mathematical Model

- Use the power flow equations: $$P_i = V_i \sum_{j=1}^{n} V_j (G_{ij} \cos \theta_{ij} + B_{ij} \sin \theta_{

the conductance and susceptance of the transmission line between buses ii and jj.

Step 3: Simplify the Equations

- Apply any necessary assumptions (e.g., flat start method with initial voltage guesses).

Step 4: Analytical Solution

- Not feasible for large power systems.

Step 5: Numerical Solution

- Use the Newton-Raphson method to solve the power flow equations iteratively.

Step 6: Simulation and Validation

- Implement the Newton-Raphson method in MATLAB.
- Validate the results with a test power system.

Step 7: Optimization

- Optimize the power flow to minimize losses or improve voltage stability.

By following these steps, you can create a robust and accurate calculation formulation for various electrical engineerin

Electrical engineering encompasses a wide range of topics that involve various calculations. Here are some common ar

1. Circuit Analysis

- **Ohm's Law:** V=IRV = IR
- **Power Calculations:** P=VIP = VI, P=I2RP = I^2R
- **Kirchhoff's Laws:** Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL)
- **Impedance and Reactance:** Calculating the impedance (ZZ) of AC circuits, inductive reactance (XL=2πfLX_

2. Electromagnetics

- **Coulomb's Law:** F=keq1q2r2F = k_e \frac{q_1 q_2}{r^2}
- **Electric Field Calculations:** E=FqE = \frac{F}{q}
- **Magnetic Field Calculations:** Using Biot-Savart Law and Ampère's Law

3. Signal Processing

- **Fourier Transforms:** Transforming signals from time domain to frequency domain
- **Laplace Transforms:** For analyzing linear time-invariant systems
- **Z-Transforms:** Used in digital signal processing for discrete-time signals

4. Control Systems

- **Transfer Functions:** H(s)=Y(s)X(s)H(s) = \frac{Y(s)}{X(s)}
- **Stability Analysis:** Using Routh-Hurwitz criterion, Nyquist criterion, and Bode plots
- **PID Controller Tuning:** Calculations for proportional, integral, and derivative gains

5. Power Systems

- **Load Flow Analysis:** Solving the power flow equations using methods like Newton-Raphson or Gauss-Seid

- **Short Circuit Calculations:** Determining the fault current levels in a power system

- **Power Factor Correction:** Calculations to improve the power factor of electrical loads

6. Electronics

- **Transistor Biasing:** Calculations for setting the operating point of transistors

- **Amplifier Design:** Gain and bandwidth calculations for different types of amplifiers

- **Oscillator Design:** Frequency and stability calculations for oscillators

7. Digital Systems

- **Logic Gates and Boolean Algebra:** Simplifying Boolean expressions

- **Flip-Flops and Counters:** Timing and state analysis

- **Digital Signal Processing:** Sampling, quantization, and digital filter design

8. Communication Systems

- **Modulation Techniques:** Calculations for AM, FM, and PM systems

- **Signal-to-Noise Ratio (SNR):** Calculating the quality of a signal

Bandwidth Calculations: Determining the bandwidth requirements for various

a

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13	Column14	Column15	Column16	Column17
input	KX										output					
X1	X2	X3	X3	X4	X5	X6	X7	X8	S1	S2	S3	S4	S5	S6	CPU	SELECT
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1
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	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
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Column18	Column19	Column20	Column21	Column22
POROCESS	REGISTER	ARITHM	LOGIC	
	0	0	0	1
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			1	

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11
	Int sensor = Ao									
	Red adc pin 0, bo		int led bank =7							
	If bo<50 then level 1		void set up () {							
	If b0<100then level 2		pin mode (led bank ,output)							
	If bo 150 the level 3									
	Let mark=0		void loop (){							
	Let space =10		int reading +analogie read (sensor)							
	Go pulser		int value = map (reding ,01023,0,255							
	Level1:									
	Lel mark =10		delay (10)							
	Let spacde =0		digital write (led bank,low)ay (3)							
	Go pulser „									
	-level 2: if value >49 et value <100){									
	Let space =4		delay (6)							
	Got pulser		digital writer (led bank low , delay							
	Level .									
	Let mark=3		if (value > 99 et value <150{							
	Let space =7		digital write (led bank , hgh							
	Pulser high 7,		digital written led low , pause „ goto main , main write (led bank,low delay (10							
	Pause mark									

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	Data Sources & Bibliography				
	Experimental Topics:				
	Data from St. Peace College, Tshingombe, and various online databases.				
	Recommended Reading:				
	Books, articles, and papers on electrical systems, engineering dynamics, and electrodynamics.				
	3.1.2.7.6.19.**4. Assignment and Project Guidelines**				
	3.1.2.7.6.19.**4.1 Assignment Title**				
	Engineering Electrical Master				
	Topics such as electrostatics, electrokinematics, electrodynamics, and power systems control.				
	3.1.2.7.6.19.**4.2 Assignment Structure**				
	Course Index:				
	A comprehensive breakdown of basic concepts, diagrams, and case studies such as load shedding, Eskom, and Schneider Electric.				
	Research and Case Studies:				
	Real-world scenarios will be presented, such as city power systems and industrial control challenges.				
	Justification & Practical Examples:				
	Analysis of the advantages and disadvantages of current systems, highlighting issues like poor distribution and inefficiency in trade systems.				
	3.1.2.7.6.19.**5. Topics for Study and Exploration**				
	3.1.2.7.6.19.**5.1 Introduction & Purpose**				
	Key Definitions:				
	Introduce critical concepts in electrical engineering, focusing on how system design and stability play a pivotal role in modern industry.				

5.2 Description of Topics

A range of subtopics such as:

Signal detection, wireless systems, telecommunication technologies, neural networks, and biological systems.

Examples:

Digital Control Systems, Microprocessors, and Stochastic Processes.

6. Advanced Topics in Electrical Engineering

6.1 Topics Covered:

Digital Telephony

Space Control Systems

Advanced Telecommunications

Wireless Telecommunication Systems

Neural Networks and Signal Processing

Signal Detection and Estimation Theory

Industrial Power Systems and Process Control

6.2 Course Focus Areas:

Understanding the interaction between electromagnetic systems, signal processing, and power systems control.

Exploring topics like fiber optics, biological computation, signal redressing, and medical image reconstruction.

3.1.2.7.6.19.**7. Additional Course Components**

3.1.2.7.6.19.**7.1 Educational Development:**

The course aims to advance knowledge in engineering, focusing on technical skills and soft skills like critical thinking and innovation in industrial design.

3.1.2.7.6.19.**7.2 Professional Evaluation:**

Evaluation of developmental theories and the impact of technological changes in the engineering sector.

3.1.2.7.6.11.1.8.3 Approach:

The research will take a holistic approach to vocational education within the engineering sector, exploring how the system can be restructured for better performance and faster responses to evolving e

Online Education and Career Development:

The approach will assess the role of online education platforms and career centers in engineer education. Special attention will be given to security and privacy concerns related to student data, acade

Rural Justice and Social Media:

The study will also consider social media and rural justice systems, analyzing how mediation, conciliation, and policy development through these platforms can contribute to solving vocational educatic

3.1.2.7.6.12.**1.7 Theoretical Framework:**

The theoretical framework for this research focuses on practical, philosophical, and regulatory aspects of vocational engineering education, with a particular emphasis on electrical engineering and its inte

Key Aspects of the Theoretical Framework:

1. Philosophies of Education:

The framework will draw on various philosophies of education, emphasizing the practical application of engineering concepts and the development of critical thinking and problem-solving skills in voca
It will involve examining cognitive processes involved in learning, including how students process, analyze, and apply information in real-world engineering tasks.

2. Curriculum Implementation:

The study will evaluate how the qualification curriculum is designed and implemented, including aspects like:
The design of career-oriented modules.
Time allocation for theory vs. practical work.
Alignment with national framework standards and assessment guidelines.

3. Irregularities in Education:

The framework will focus on identifying and addressing irregularities in:
Marking schemes and record-keeping.
The design of time tables and the allocation of learning hours.
Assessments and results release issues that undermine the credibility of the system.

4. Regulations and Policy:

Focus on regulatory frameworks guiding vocational education and the role of SETAs (Sector Education and Training Authorities), particularly the EDPSETA (Engineering, Development and Professional S
Examination of the philosophy behind the National Qualifications Framework (NQF) and how it impacts the engineering education system in rural areas.

5. Integration with the National Framework:

Conceptual integration of educational practices with the national framework ensuring that learning outcomes are consistently aligned with industry standards and national policies.
This includes the role of School Governing Bodies (SGBs) and other stakeholders in shaping curricula and assessments.

3.1.2.7.6.13.1.8 Methodological Approach:

The methodology will focus on analyzing the education system's practices in vocational engineering institutions, including system design, assessment practices, and data management. It will include the e

Key Elements of the Methodological Approach:

1. Teaching System and Policies:

Study the teaching and assessment systems used in vocational colleges and engineering academies, focusing on the semester design, curriculum delivery, and outcomes assessment.

2. Systematic Evaluation:

Evaluate how timetables and teaching methods in engineering are designed to ensure students receive both theoretical knowledge and practical experience. The study will look into whether these syst

3. Trade-Related Manufacturing Systems:

Explore engineering dockets and portfolios that track the progress of students in applied fields such as electrical engineering.
Identify gaps or irregularities in the manufacturing and assessment systems and propose improvements.

4. System Failures:

Analyze areas where systemic failures such as slow marking, delayed results, and inconsistent feedback have led to student dissatisfaction and academic inconsistencies.
Focus on developing new methods to resolve these issues in a timely and efficient manner.

5. Engineering Systems and Registration:

The research will assess how registration processes work for engineering students, particularly the suspension of assessments and how these processes can be streamlined or reformed.

6. Assessment Design and Evaluation:

A comprehensive look at assessment processes—whether mark sheets are accurate, grades are timely, and how feedback is integrated into the development of students' skills.

1.8.2 Research Design:

The research design for this study centers on creating an engineering model that highlights the relationship between academic outcomes, curriculum implementation, and real-world application.

Field-Based Model:

Develop a model that includes both academic and practical assessments, allowing for an integrated approach to evaluating students' engineering competencies.

Create outcome-based assessments that are aligned with national qualification standards and industry needs.

3.1.2.7.6.14.**1.8.3 Approach:**

The study will adopt a multifaceted approach that integrates traditional learning environments with the advent of online education systems and other technology-based solutions to improve vocational tr

Key Aspects:

1. Industrial Education System:

The research will consider the targeted outcomes of industrial education, including skills development, career orientation, and the integration of educational technology into vocational programs.

2. Online and Social Media Approaches:

Examine the use of online platforms, social media tools, and career development centers as part of the educational system. These platforms can help rural students access better learning resources an

3. Rural Justice and Education:

Investigate the intersection of justice systems, education policies, and social development in rural areas, especially how these elements influence educational outcomes for vocational learners in engineer

3.1.2.5.power Systems and Renewable Energy

Optimization of Microgrid Systems

Investigating AI-driven optimization for hybrid renewable microgrids.

Case study on cost-benefit analysis of microgrids in remote areas.

Smart Grid and Energy Storage Technologies

Enhancing demand response strategies using machine learning.

Optimization of battery energy storage for grid stabilization.

Wireless Power Transmission

Developing high-efficiency resonant inductive coupling systems.

Applications of wireless power transfer in electric vehicles.

3.1.2.5.2. Control Systems and Automation

AI-Based Predictive Maintenance in Industrial Systems

Machine learning for fault detection in power transformers.

Predicting failures in rotating machinery using deep learning.

Advanced Robotics and Control Algorithms

Adaptive control for autonomous robotic arms.

Path optimization algorithms for multi-agent robotic systems.
IoT-Based Smart Home Automation
Implementing AI-driven smart home systems for energy efficiency.
Secure communication protocols for IoT-based automation.

3.1.2.5.3. Embedded Systems and Internet of Things (IoT)

Edge Computing for IoT Devices
Implementing real-time AI inference in low-power embedded systems.
Optimization of edge computing frameworks for industrial IoT.
Wearable Health Monitoring Devices
Developing ECG monitoring using flexible sensors and AI analysis.
Low-power IoT solutions for real-time health monitoring.

3.1.2.5.4. Signal Processing and Telecommunications

5G and Beyond: Enhancing Wireless Communications
AI-driven beamforming techniques for 6G networks.
Security enhancements in millimeter-wave 5G networks.
Speech and Image Processing Using AI
Deep learning-based speech enhancement for hearing aids.
Real-time image recognition for autonomous navigation.

3.1.2.5.5. Electric Vehicles and Sustainable Transportation

Battery Management Systems for Electric Vehicles
AI-enhanced state-of-charge prediction for EV batteries.
Ultracapacitor integration for extended EV range.
Inductive Charging for Electric Vehicles
Wireless power transfer optimization for fast charging.
Roadway-embedded charging systems for continuous power.

3.1.2.5.6. Biomedical Engineering and Assistive Technologies

Neural Interfaces for Brain-Computer Interaction
EEG-based control systems for prosthetic devices.
AI-driven signal processing for seizure detection.
Smart Prosthetics and Exoskeletons
Sensor fusion for adaptive gait control in lower-limb exoskeletons.
AI-driven gesture recognition for upper-limb prosthetics.

Would you like a detailed methodology or research proposal on any of these topics?

.1.2.7.6.26.Electrician Sector Projects and Training

1. Trade Duration & National Qualification:
   Duration: 2 years for electrical trade with different semesters.
   Hours & Practical Skills:
      Practical visits to transmission and distribution substations for 10 hours.
      Tasks include drawing actual circuit diagrams, assembling solar panels, and understanding the principles of power generation by solar, wind, and other non-conventional methods.
2. Practical Skills & Circuit Installation:
   Overhead Domestic Service Line Installation: Erecting overhead service lines and connecting them to a 230V distribution system.
   Practical Installation of Insulators: Used in low-tension (LT) lines for safety.
   Circuit Breakers & Relays: Troubleshooting and repairing faults in circuit breakers, setting up current multipliers for relay operations, and testing tripping characteristics for current and short circuits.
   Transmission and Distribution: Understanding line insulators, overhead poles, and methods of joining conductors.
3. Solar Power Systems & Electrical Installations:
   Solar Panel Systems: Preparation of layout plans and identification of different components in solar systems. Erecting overhead lines and ensuring proper electrical connections.
   Wind Power: Understanding the principles and operation of wind energy systems alongside other renewable energy sources.
4. Assessment & Industrial Visits:
   Electrical work assessments, including DC voltage control circuits, alarm systems using sensors, and basic electrical principles like resistance measurement.
   Industrial visits to power plants and substations to observe real-world applications of electrical systems.
5. Theory and Practical Application:
   Electrical Theory: Includes learning about magnetism, electromagnetism, and using measurement instruments like multimeters.
   Project Work: Involves designing circuits for various electrical applications, such as controlling motor pumps and providing emergency light solutions.

Advanced Power Engineering & Systems Projects

1. Electric Power Engineering:
   SCADA Systems: Learning how power grids are managed with SCADA (Supervisory Control and Data Acquisition) systems.
   Transmission & Protection: Gaining knowledge on the protection systems for transformers and transmission lines.
   Photovoltaic Power & Wind Power Systems: Investigating renewable energy sources and understanding the functioning of photovoltaic and wind power plants.
2. Fundamentals of Power Engineering:
   AC, DC, and Three-Phase Technology: Understanding the basics of alternating current (AC), direct current (DC), and three-phase systems.
   Generator Protection: Studying protection mechanisms for generators in the power grid.
3. Experimental Work & Research:
   Measuring the Band Gap of Semiconductors: A fundamental experiment in electrical engineering, focusing on material properties.
   Thermoelectric and Electromagnetic Experiments: Investigating thermoelectric effects, induction voltage, and thermodynamic cycles of heat pumps.
   Magnetic Field Measurement: Using apparatus like a Teslameter to measure the magnetic field generated by current flowing through coils.

Objective and Educational Aims

The primary goal of these projects is to:

Equip learners with both practical and theoretical knowledge required in the electrical trade, especially focusing on electrical installations, solar power, wind power, and troubleshooting electrical syste
Prepare students for the evolving electrical power engineering industry, providing them with the necessary skills to work with complex systems such as power grids, transmission lines, and renewable e
Foster critical thinking and hands-on skills through the completion of industrial visits, project work, and practical experiments.

Key Learning Outcomes

Understanding the fundamentals of electrical power systems and their operation.
Gaining hands-on experience with real-world electrical installations and troubleshooting.
Understanding renewable energy technologies and their application in modern power generation.
Learning to use advanced measurement tools and equipment for electrical systems testing and diagnostics.

3.1.2.7.6.25.2.Project Topic Overview: Fundamentals of Power Electronics

The course structure for Power Electronics typically covers a comprehensive set of topics related to the fundamental concepts and applications of power electronics systems. Below is an outline of the co

Course Structure

1. Introduction to Power Electronics

Lecture Hours: Introduction to the field of power electronics, its significance, and its various applications in modern electrical systems. Key topics include basic principles and terminology.

2. Semiconductor Devices

Lecture Hours: Overview of different semiconductor devices used in power electronics, such as diodes, transistors (BJTs, MOSFETs, IGBTs), and thyristors.
Key Areas: Working principles, characteristics, and applications of these devices in switching and control.

3. Review of Electrical Concepts

Lecture Hours: A brief review of essential electrical concepts such as voltage, current, resistance, power, and energy. The focus is on how these concepts relate to power electronic devices and circuits

4. Line Frequency Diode Rectifiers

Lecture Hours: The study of basic rectification circuits using diodes, including half-wave and full-wave rectifiers, and the conversion of AC to DC power at line frequency.
Key Areas: Efficiency, output waveforms, and harmonic distortion.

5. Line Frequency Phase Controlled Rectifiers

Lecture Hours: Exploration of phase-controlled rectifiers (such as thyristor-based rectifiers) to control the output DC voltage using phase control techniques.
Key Areas: Applications in power systems and industrial control.

6. DC-DC Switch Mode Converters

Lecture Hours: In-depth study of various types of DC-DC converters such as buck, boost, and buck-boost converters.
Key Areas: Efficiency, switching frequency, and applications in power supply circuits.

7. Pulse-Width Modulation (PWM) with Bipolar and Unipolar Switching

Lecture Hours: The role of PWM in controlling switch-mode power supplies.
Key Areas: Bipolar vs. unipolar switching, voltage regulation, and modulation techniques.

8. Switch Mode DC-AC Inverters

Lecture Hours: Study of inverters that convert DC to AC, including basic topologies like square wave, sine wave, and modified sine wave inverters.
Key Areas: Power factor, efficiency, and applications in renewable energy systems like solar power.

9. Power Supply Applications

Lecture Hours: The design and application of power supplies for various uses such as industrial equipment, consumer electronics, and renewable energy systems.
Key Areas: Voltage regulation, filtering, and noise suppression techniques.

10. Motor Drive Applications

Lecture Hours: Power electronic circuits used in controlling electric motors, including DC motors, induction motors, and stepper motors.
Key Areas: Speed control, torque control, and motor drive techniques.

11. Computer Lab

Lab Hours: Hands-on sessions where students simulate, design, and test power electronics circuits using software tools such as MATLAB/Simulink or PSPICE.

Key Areas: Simulation of converters, inverters, and other power electronic devices.

Power Program Lab Structure

The Power Program Lab focuses on practical, hands-on experience with power electronics systems, including a variety of experiments and real-time testing of electrical equipment.

Equipment: The lab is typically equipped with power poles, power supply units, voltmeters, oscilloscopes, and other essential measurement and testing tools.

Lab Activities:

Combination of Total Methods: A blend of theoretical and practical approaches to designing, testing, and troubleshooting power electronic circuits.

Structure and Applications: Focuses on the structure of power electronics systems, including converters, inverters, and motor control applications.

Key Lab Topics:

DC-DC Converters: Designing and simulating buck and boost converters for voltage regulation.

Inverter Testing: Testing and measuring the efficiency of DC-AC inverters.

Power Supply Systems: Building and analyzing regulated power supplies and their performance.

Motor Drive Systems: Designing and testing variable-speed motor control circuits using PWM.

Learning Outcomes

By the end of this course, students should be able to:

Understand and apply semiconductor devices for switching and rectification.

Design and analyze rectifier and converter circuits for different power electronic applications.

Implement PWM techniques for controlling power supplies and motor drives.

Gain practical experience in laboratory-based simulations and real-world power electronics applications.

1. Magnetism and Electromagnetism (Biot-Savart Law)

In the lab, you'll encounter experiments that involve magnetic fields produced by electric currents. One of the most relevant laws for this purpose is the Biot-Savart Law, which gives the magnetic field ge

Biot-Savart Law:

The law is mathematically expressed as:

B=μ04π∫Idl×r^r2\mathbf{B} = \frac{\mu_0}{4\pi} \int \frac{I \, d\mathbf{l} \times \hat{r}}{r^2}B=4πμ0∫r2Idl×r^

Where:

B\mathbf{B}B is the magnetic field at a point,

μ0\mu_0μ0 is the permeability of free space,

III is the current,

dld\mathbf{l}dl is the infinitesimal length of the current element,

r^\hat{r}r^ is the unit vector pointing from the current element to the point where the field is being calculated,

rrr is the distance from the current element to the observation point.

This equation helps calculate the magnetic field produced by a current-carrying conductor at any point in space. When you're dealing with coils and solenoids, this law becomes essential in determining h

Integral Derivation:

The integral form of the Biot-Savart Law essentially sums (integrates) the contributions of all infinitesimal current elements (dld\mathbf{l}dl) along the conductor to determine the resultant magnetic field

If you have a current flowing in a straight conductor, the magnetic field at a distance rrr from the conductor can be derived from this law by setting up the appropriate integration. For a straight, infinite c

B=μ0I2πrB = \frac{\mu_0 I}{2 \pi r}B=2πrμ0I

2. Magnetic Field in Air Coil Experiment

For your experiment involving the magnetic field of a long air coil, you're measuring the magnetic field BBB generated by current flowing through the coil. The objective is to understand how the magneti

The magnetic field inside a long solenoid (or air coil) can be calculated using Ampère's Law:

B=μ0nIB = \mu_0 n IB=μ0nI

Where:

BBB is the magnetic field inside the coil,

μ0\mu_0μ0 is the permeability of free space,

nnn is the number of turns per unit length of the coil,

III is the current flowing through the coil.

This relationship shows that the magnetic field strength is directly proportional to both the current III and the number of turns per unit length nnn. The experiment involves adjusting these parameters an

3. Transformer Protection and Power Transmission

In the power systems lab, you might also look at the protection of transformers and power transmission systems. In this case, experiments focus on measuring fault currents, testing protection relays, an

4. Three-Phase Systems and Transmission Line Faults

In power systems, three-phase transmission lines are crucial. Faults in transmission lines (e.g., line-to-ground faults, line-to-line faults) can cause significant disruptions, and it's important to understand h

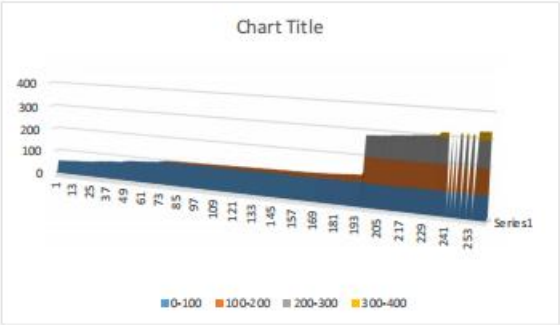
5. Photovoltaic and Wind Power Systems

The lab also involves studying renewable power systems like photovoltaic (solar) and wind power. These systems convert solar and wind energy into electrical power, which involves understanding the co

Experimental Procedure for Magnetic Field Measurement:

In your experiment measuring the magnetic field around an air coil, the procedure involves:

1. Set Up: Connect the coils to the high-current power supply and position the Tesla meter and Hall sensor at different locations around the coil.
2. Measurement: Vary the current and record the magnetic field at different points along the coil using the Tesla meter. Ensure you adjust the position of the probe to capture the changes in the magne
3. Repeat the Experiment: For different numbers of turns and coil lengths, repeat the experiment to understand how the magnetic field varies with these parameters.



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200	10	210		
300	15)			
400	20)			
500	25			

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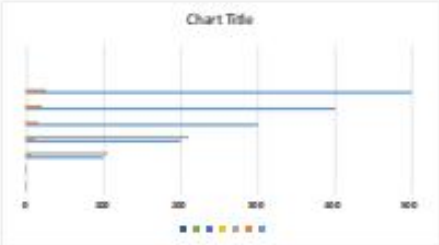

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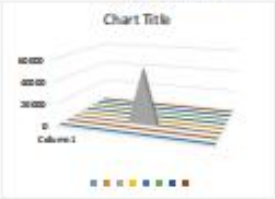
	MONTH		120		WORKBOOK		
	PAYMENT		660		WORKBOOK		



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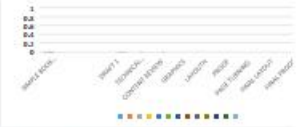

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#VALUE!	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13	Column14
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	SIMPLE BOOK PRODUCT SCHEDULE			DRAFT 1	TECHNICAL RCONTENT REG		RAPHICS	LAYOUT H	PROOF	PAGE TURNIN	FINAL LAYOUT	FINAL PROOF	
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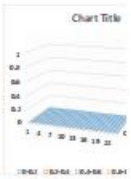

ORIGINAL PRODUCT

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11
PRODUCT ID		UNITY PRICE			VALUE OF INVENTORY UNITS STOCK				FIELD	
PRODUCT ID									TABLE	
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									SORT	
									SHOW	
									CRITERIA	
									OR	

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FIRST NAME		LAST NAME		PHONE NUMBER		CITY		FIELD		
CUSTOMERS		CUSTOMERS		CUSTOMER		CUSTOMERS		TABLE		
								SORT		
ORDER ID		CUSTOMER ID		EMPLOYEE ID		ORDER DATE				
ORDERS		ORDERS		ORDERS		ORDERS				

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11
REPORT HEADER CUSTOMES										
CUSTOMERS ID			FIRST NAME		LAST NAME		AD			

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13	Column14	Column15	Column16	Column17
UNIT	CHARGE	CURRENT	QUATITY AH		VOLTAGE	VOLT AMP		WATH	COS	KWH	VAR	KVH	KVAH	FREQUENCE		MONTH
1																
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GHZ	BIT GI HERTZ		OCTAL	PIXEL	

MARK

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11
	Sn	Student name	Father name	dob	Gender	Course	Model	Email id	adress	

'

' Macro1 Macro	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13	Column14	Column15
' Code resetb and initialize form with default form . Sub reset _form () Dim I row as long With .txt student name.text="" " Txt student name backcolor +vb white Txt father name .text ="" Txt father name back color + vb whit														
'	8	9												

```
'
    Application.Goto Reference:="Macro1"
    ActiveWorkbook.Save
    ActiveWorkbook.Save
    Range("B34").Select
    ActiveSheet.Paste
    Range("B36:Y63").Select
    ActiveSheet.ListObjects.Add(xlSrcRange, Range("$B$36:$Y$63"), , xlNo).Name = _
        "Table16"
    Range("Table16[#All]").Select
    ActiveWindow.ScrollRow = 31

    ActiveWindow.ScrollRow = 30
    ActiveWindow.ScrollRow = 29
    ActiveWindow.ScrollRow = 28
    ActiveWindow.ScrollRow = 27
    ActiveWindow.ScrollRow = 26
    Range("C32").Select
    ActiveWindow.ScrollColumn = 1
    Range("B38").Select
    ActiveCell.FormulaR1C1 = "7"
    Range("C38").Select
    ActiveCell.FormulaR1C1 = "8"
    Range("D38").Select
    ActiveCell.FormulaR1C1 = "9"
    Range("E38").Select
    ActiveWorkbook.Save
End Sub

Sub Macro2()
'
' Macro2 Macro
' text field buttons for the number operator button for the result off , clear ,back space option explicit public class form1 dim operand 1 as double dim operad 2 as double dim (operator) as string dim has decimal boolean
'

'
    Application.Run _
        "Copy of PROJECT DRAWING WORKSHET   TSHINGOMBE DESIGN ANALYSE ENGIN  Book12.xlsx!Macro2"
End Sub
Sub Macro3()
'
' Macro3 Macro
' "500000ff03ff00001800a0410000d00050000001" string .cmd="" "; cmd=cmd+" 5000";//sub head (not) cmd=cmd+"00"//network number cmd=cmd+"ff";//plc number cmd+" "03ff";//demand object module i/o number cm
'

'
End Sub
```

Input output	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11
X1	X2	X3	X4	X5	X6	X7	S1	S2	S0	Reg select	Hardware virtual
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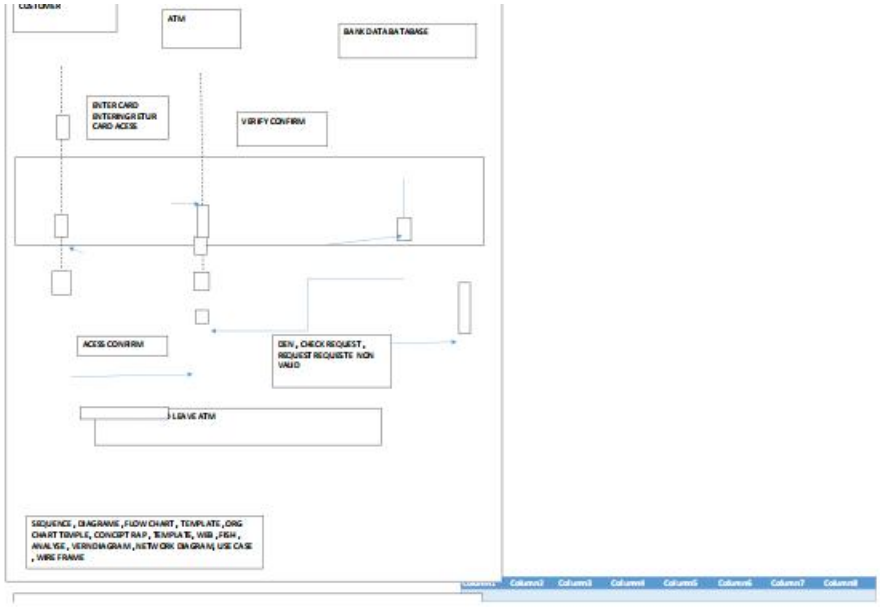
CUSTOMER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BANK DATABATABASE
ENTER CARD
ENTERINGRISTUR
CARD ACESS
VERIFY CONFIRM
ACESS CONFIRM
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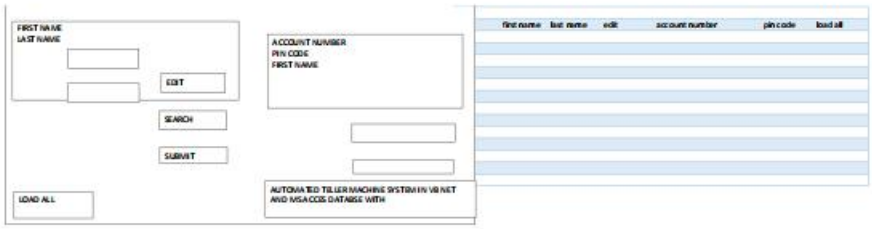
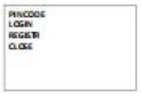
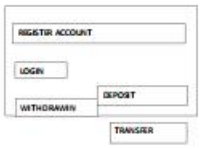
REQUEST REQUESTE NON
VALID
LEAVE ATM
SEQUENCE , DIAGRAME , FLOW CHART , TEMPLATE , ORG
CHART TEMPLE, CONCEPT RAP , TEMPLATE, WBB , FISH ,
ANALYSE , VERNDIAGRAM , NETWORK DIAGRAM, USE CASE
, WIRE FRAME







Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13	Column14
input	KX										output		
X1	X2	X3	X3	X4	X5	X6	X7	X8	S1	S2	S3	S4	S5
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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	0	0	0	0	0	0	0	0	0	0	0	1	1	1
	0	0	0	0	0	0	0	0	0	0	1	1	1	1
	0	0	0	0	0	0	0	0	0	1	1	1	1	1

0	0	0	0	0	0	0	0	1	1	1	1	1	1
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0	0		1	1	1	1	1	1	1	1	1	1	1
0	0	1	1	1	1	1	1	1	1	1	1	1	1
0	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1

BASIC SOFTWARE ENGINEERING CONCEPT SOLVE ELECTRICAL AND ELECTRONICSENGINEERING PROBLEM ..TESTING DOCUMENTING I/O PROGRAMMIE BASIC STRUCTURE DESIGN

Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11

```
int sensor= Ao
Red adc pin0, bo        int led bank =7

If bo<50 then level 1      void  set up  () {
If bO<100then level 2      pin mode ( led bank ,output)
If bo 150 the level 3
Let mark=0                 void loop ()(
Let space =10       int reading =analogie read (sensor)
Go pulser           int value = map ( reding ,0,1023,0,255
Level1:
Lelmark=10       delay (10)
Let space =0  digital write (led bank,low)ay (3)

Go pulser .
-level 2: if value >49 et value <100)(
Let space =4    delay (6)
Got pulser      digital writer (led bank low , delay

Level .
Let mark=3          if ( value > 99 et value <150)(
Let space =7  digital write (led bank , hgh
Pulser high 7,   digital written  led low , pause  , goto main , main write (led bank,low delay (10
Pause  mark
```

Column6
UNITY SUBJECT DRAWING SUBJECT TOPIC MODULE
Curriculum assessment assessment
Name : tshingombe tshitadi fiston
1.1
Thesis. Degree honor, council quality rules low become justice development court and labor relations conciliation mediation, Engineering electrical trade research policy skill ,safety security order develop ,defense order
2.1 Thesis. Degree honor, council quality rules low become justice development court and labour relations conciliation mediation, Engineering electrical trade research policy skill ,safety security order develop ,defense order
Thesis. Degree honour, council quality rules low become justice development court and labour relations counciliation mediation, Engineering electrical trade research policy skill ,safety security order developm ,defense order
5.1 Examination project
Master's in Artificial General Intelligence and Social Sciences
Introduction to Artificial General Intelligence
AGI and Human Cognition
Ethical Considerations of AGI
AGI and Economic Implications
AGI in Public Policy and Governance
Social Impact of AGI
tshingombe tshitadi
Masters /engineering
About Me
Name
Follow Me On
My Education
Work Experience
Skills
Professional Skills
My Interests & Hobbies
Engineering electrical assessment career but sustainability
Some of my work & Certifications
Some Works
Thesis & Publications
AGI in Human-Machine Collaboration
Future Scenarios of AGI Development
4.1 .12.14,,
online Retail and E-commerce in the Renewable Energy Sector
Introduction to E-commerce in the Renewable Energy Sector
Understanding the Renewable Energy Market
E-commerce Strategies for Renewable Energy Products
Consumer Behavior in Online Retail
Digital Marketing for Renewable Energy E-commerce
Sustainable Practices in E-commerce
Case Studies in Renewable Energy E-commerce
Regulatory Environment for Online Retail in Renewable Energy

Future Trends in Online Retail and Renewable Energy
Publishing and Natural Resources Management
Introduction to Sustainable Natural Resources Management
The Role of Publishing in Sustainability
Environmental Journalism and Communication
Digital Publishing and New Media
Content Creation for Natural Resource Management
Policy Advocacy and Public Engagement
Sustainable Practices in Publishing
Case Studies in Effective Sustainability Communication
Masters in Supply Chain Management and Traceability
Introduction to Supply Chain Management
Principles of Traceability
Software Engineering Basics
Supply Chain Digitalization
Data Management in Supply Chains
Blockchain for Supply Chain Traceabilty
IoT and Smart Supply Chains
Security and Privacy in Supply Chain Software
Case Studies and Real-world Applications
Social Media Marketing for Real Estate, Rental, and Leasing
Introduction to Social Media Marketing
Target Audience Analysis
Content Creation for Real Estate
Platform-Specific Strategies
Social Media Advertising
Engagement and Community Building
Metrics and Analytics
Brand Reputation Management
Case Studies and Best Practices
Advanced Telemedicine and Remote Healthcare Production
Introduction to Telemedicine and Remote Healthcare
Television and Radio Production Essentials
Medical Narrative and Storytelling
Remote Healthcare Technologies and Innovations
Ethical and Legal Considerations in Telehealth Media
Producing Engaging Content for Healthcare
Audience Engagement and Feedback in Healthcare Broadcasting
Case Studies and Best Practices
Future Trends in Telemedicine and Media Integration
Technical Writing for Technology
Introduction to Technical Writing
Understanding Your Audience
Research and Information Gathering
Document Design and Formatting
Writing Manuals and Guides
Using Technology Tools for Technical Writing
Editing and Proofreading
Ethics in Technical Writing
Effective Communication in Teams

Masters in Vertical Farming and Urban Agriculture with Focus on Synthetic Biology
Introduction to Vertical Farming and Urban Agriculture
Fundamentals of Synthetic Biology
Applications of Synthetic Biology in Urban Agriculture
Design of Vertical Farming Systems
Integration of Biotechnology in Crop Production
Environmental and Economic Impacts of Urban Agriculture
Regulatory and Ethical Considerations in Synthetic Biology
Future Trends in Vertical Farming and Synthetic Biology
Master's in Urban Water Supply, Sewerage, Waste Management, and Remediation Activities
Introduction to Urban Water Supply Systems
Sewerage Systems Design and Management
Urban Waste Management Strategies
Remediation Activities and Technologies
Policy and Regulation in Urban Water and Waste
Climate Change and its Impact on Water and Waste Management
Sustainable Innovations in Water and Waste Systems
Integrating Water and Waste Systems into Urban Planning
Transportation and Warehousing in Tourism Planning and Development
Introduction to Tourism Logistics
Transportation Infrastructure in Tourism
Role of Warehousing in Tourism
Sustainable Transport Solutions
Tourism Supply Chain Management
Policy and Regulations in Tourism Transport
Innovations in Tourism Warehousing
Case Studies on Tourism and Logistics
Spatial Computing in Telecommunications
Introduction to Spatial Computing
Spatial Data and Telecommunications
Geographical Information Systems (GIS) in Telecom
Network Planning and Optimization Using Spatial Computing
Spatial Data Analytics for Telecom
Augmented Reality (AR) in Telecommunication Services
5G and Spatial Computing
Privacy and Security in Spatial Telecommunications
Advanced Legal Studies in Public Administration and Safety
Introduction to Public Law
Constitutional Law and Governance
Administrative Law
Legal Frameworks for Public Safety
Ethics in Public Administration
Public Policy and Legal Implications
Human Rights and Social Justice
Crisis Management and Legal Compliance
Metallurgy in Oil and Gas Production, Refining, and Transport
Introduction to Metallurgy in Oil and Gas
Material Selection for Oil and Gas Production
Corrosion Mechanisms and Prevention
Metallurgical Processes in Refining

Pipeline Materials and Design
Advanced Coatings and Surface Treatments
Environmental Impact and Sustainability in Metallurgy
Failure Analysis and Case Studies
Future Trends in Metallurgy for Oil and Gas
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Fermentation Technology
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Future Trends in Genetic Engineering Manufacturing
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Data Warehousing and Analytics
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Blockchain Consensus Mechanisms
Smart Contracts
Decentralized Finance (DeFi)

Blockchain in Supply Chain Management
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NFTs and Digital Assets
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Data Privacy and Integrity in Bibliotechnology
Implementing Security Policies for Digital Libraries
Access Control in Library Networks
Digital Rights Management in Bibliotechnology
Network Security Essentials for Digital Libraries
Incident Response and Recovery for Digital Libraries
Emerging Cybersecurity Technologies in Bibliotechnology
Edge Computing in Modern Power and Energy Systems
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IoT Applications in Power Systems
Real-time Data Processing
Security and Privacy in Edge Computing
Edge Analytics for Energy Management
Energy Efficiency Optimization
Case Studies on Edge Computing in Energy
Future Trends in Edge Computing for Energy Systems
Edge Computing for Modern Power and Energy Systems
Introduction to Edge Computing
Role of Edge Computing in Smart Grids
Edge Computing for Renewable Energy Integration
Data Management and Security in Edge Computing
Machine Learning Applications on the Edge
Case Studies in Edge Computing for Energy Systems
Challenges and Future Trends
Masters in Cyber-Physical Systems and Information Technology
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CPS Security and Privacy
Machine Learning in CPS
Real-Time Systems and CPS
Simulation and Modeling in CPS
Applications and Case Studies of CPS
Masters in Distributed-Ledger Technology Applications in Educational Technology
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Blockchain for Secure Credentialing
Smart Contracts in Educational Transactions
DLT-based Learning Management Systems
Privacy and Data Security in DLT
Case Studies of DLT in Education
Future Trends in DLT and EdTech
Master's in Adult Education Services

Introduction to Adult Education
Theories of Adult Learning
Curriculum Design for Adult Learners
Assessment and Evaluation in Adult Education
Technology Integration in Adult Learning
Diversity and Inclusion in Adult Education
Motivational Strategies for Adult Learners
Professional Development for Adult Educators
Quantum Computing in Systems Engineering
Introduction to Quantum Computing
Quantum Algorithms
Quantum Gates and Circuits
Quantum Information Theory
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Quantum Programming Languages
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Fundamentals of Electrochemical Engineering
RPA Tools and Platforms
Automating Electrochemical Process Controls
Data Collection and Analysis in Electrochemical Systems
Machine Learning and RPA in Electrochemical Engineering
RPA Implementation Challenges and Solutions
Case Studies and Industry Applications
Integrating Educational Technology in Renewable Energy Studies
Introduction to Renewable Energy
Educational Technology Tools
Designing Interactive Learning Modules
Gamification in Renewable Energy Education
Virtual Labs and Simulations
Assessing Learner Outcomes in Technology-Driven Curriculum
Case Studies in Renewable Energy Education
Challenges in Integrating Technology and Renewable Energy Education
Wholesale Trade Management in Industrial Engineering
Introduction to Wholesale Trade
Supply Chain Dynamics
Inventory Control Methods
Logistics and Distribution
Procurement Strategies
Market Analysis and Forecasting
Risk Management in Wholesale Trade
Regulatory and Ethical Considerations
Advanced Wireless Communications
Introduction to Wireless Communications
Radio Frequency Fundamentals
Wireless Signal Propagation
Multiple Access Techniques
Wireless Networking and Protocols
Cellular Systems and 5G
Antenna Theory and Design
Wireless Security
IoT and Wireless Sensor Networks
Advanced Electrical Engineering in Construction and Civil Engineering
Fundamentals of Electrical Systems in Construction
Electrical Safety Standards and Codes
Integration of Electrical Systems in Building Design
Sustainable and Renewable Energy Technologies
Smart Grids and Intelligent Networks
Electrical System Design and Simulation
Power Quality and Energy Management
Electrical Systems in Infrastructure Projects
Electrical Systems in Construction and Civil Engineering
Introduction to Electrical Systems in Construction
Power Distribution in Buildings
Lighting Systems and Design
Electrical Safety Standards and Regulations
Sustainability in Electrical Engineering
Smart Buildings and IoT Integration
Electrical Load Analysis and Estimation
Integration of Renewable Energy Sources
Project Management in Electrical Engineering
Doctorate in Specialist Engineering Infrastructure and Contractors: Electrical Engineering
Advanced Power System Analysis
Renewable Energy Systems
Electrical Infrastructure Design and Management
Smart Grids and IoT Applications
High Voltage Engineering
Project Management in Electrical Engineering
Energy Policy and Ethical Considerations
Sustainable Electrical Engineering Practices
Admission Ready - Completing your application - Atlantic International University
Roberto Aldrett - AIU
tshingombe tshitadi
Masters /engineering
About Me
Name
Follow Me On
My Education

Work Experience

Skills

Professional Skills
My Interests & Hobbies

Engineering electrical assessment career but sustainability
Some of my work & Certifications

Some Works
Thesis & Publications

Contact
Send me a message
Thank You!
Student name : tshingombe tshitadi
4.1 .12.15..1 topics :
1 AGI in Human-Machine Collaboration
Future Scenarios of AGI Development
4.1 .12.15..1.10nline Retail and E-commerce in the Renewable Energy Sector
1.2 Introduction to E-commerce in the Renewable Energy Sector
1.3 Understanding the Renewable Energy Market
Targeted, flexible and co-ordinated policies can unlock the potential of e-commerce
1.4. E-commerce Strategies for Renewable Energy Products
1.4 Consumer Behavior in Online Retail
3.1 Electric power B2B descriptions
3.2 Notations
1.5 Digital Marketing for Renewable Energy E-commerce
1.6. Sustainable Practices in E-commerce
1.7 Case Studies in Renewable Energy E-commerce:
3.3 Fusion of behavioral data
3.4 Fusion of item attribute information
3.5 Fusion of behavioral data and item information
1.8 Regulatory Environment for Online Retail in Renewable Energy:
Experiments and discussion
4.1 Data descriptions
1.9 Future Trends in Online Retail and Renewable Energy
Future Research Frontiers in AI for the E-commerce Sector
4.1 .12.15..2.1Publishing and Natural Resources Management:
4.1 .12.15.2.2 Introduction to Sustainable Natural Resources Management:
This topic covers the fundamental principles of sustainable natural resource management and its importance for future generations. Challenges in natural resource management for ecological sustainability
2.3.1 Resource planning strategy and ownership regime
2.3 The Role of Publishing in Sustainability:
2.4 Environmental Journalism and Communication
2.5 Digital Publishing and New Media
2.6 Content Creation for Natural Resource Management
2.2. New journals on SDG-relevant topics
2.8 Sustainable Practices in Publishing:

2.9. Case Studies in Effective Sustainability Communication:
3.3. Equity recommended
4. Translating research into practice
4.1. Cognitive accessibility
4.1 .12.15..3.1 Masters in Supply Chain Management and Traceability
3.2 Introduction to Supply Chain Management
between functions within their own companies, but also with other An Introduction to Supply Chain Management
3.3. Principles of Traceability
3.4 Software Engineering Basics:
3.5 Supply Chain Digitalization
3.6 Data Management in Supply Chains
3.7 Blockchain for Supply Chain Traceability
IoT and Smart Supply Chains
3.8 Security and Privacy in Supply Chain Software:
3.9 Case Studies and Real-world Applications
4.1 .12.15..4.1 Social Media Marketing for Real Estate, Rental, and Leasing
4.1 Social Media Marketing for Real Estate, Rental, and Leasing
4.2 Introduction to Social Media Marketing
4.2 Introduction to Social Media Marketing
Understanding the basic concepts of social media marketing and its importance in the real estate, rental, and leasing sectors.: Understanding the Basic Concepts of Social Media Marketing
Importance of Social Media Marketing in Real Estate, Rental, and Leasing
4.3 Target Audience Analysis
4.4 Content Creation for Real Estate
Strategies for creating compelling content that attracts and retains the interest of potential clients on social media.: Target Audience Analysis for Real Estate, Rental, and Leasing on Social Media
4.5 Platform-Specific Strategies:
Learning to tailor marketing strategies for different social media platforms such as Facebook, Instagram, and LinkedIn.: Platform-Specific Strategies for Social Media Marketing
4.6 Social Media Advertising:
Engagement and Community Building:
Metrics and Analytics: Engagement and Community Building
Case Studies and Best Practices
4.6 Case Studies and Best Practices
.4.1 .12.15..5.1 Advanced Telemedicine and Remote Healthcare Production
5.2 Introduction to Telemedicine and Remote Healthcare: Advanced Telemedicine and Remote Healthcare Production
5.3 Television and Radio Production Essentials:
5.4 Medical Narrative and Storytelling
Crafting compelling stories that communicate complex healthcare concepts effectively to a diverse audience.: 5.3 Television and Radio Production Essentials
5.6 Remote Healthcare Technologies and Innovations:
5.9 Audience Engagement and Feedback in Healthcare Broadcasting
5.11 Future Trends in Telemedicine and Media Integration
4.1 .12.15.6.1 Technical Writing for Technology
6.2 Introduction to Technical Writing
6.3 Understanding Your Audience:
6.9 Editing and Proofreading: Editing and Proofreading
6.10 Ethics in Technical Writing
6.10 Ethics in Technical Writing
6.12 Effective Communication in Teams
4.1 .12.15.7.1.Masters in Vertical Farming and Urban Agriculture with Focus on Synthetic Biology
7.2Introduction to Vertical Farming and Urban Agriculture
7.3.Fundamentals of Synthetic Biology
Study the basic principles of synthetic biology, including DNA sequencing, genetic engineering, and how these tools are used to optimize plant growth.: Fundamentals of Synthetic Biology

7.4..Applications of Synthetic Biology in Urban Agriculture
7.6Design of Vertical Farming Systems
7.7Integration of Biotechnology in Crop Production
7.8.Environmental and Economic Impacts of Urban Agriculture
7.9.Regulatory and Ethical Considerations in Synthetic Biology
7.10Future Trends in Vertical Farming and Synthetic Biology
4.1 .12.15..8.Master's in Urban Water Supply, Sewerage, Waste Management, and Remediation Activities
8.2.Introduction to Urban Water Supply Systems
8.3 Sewerage Systems Design and Manage
8.3.Sewerage Systems Design and Management
Learn about the engineering, design, and operational management of urban sewerage systems, focusing on sustainable practices and innovations in waste treatment and resource recovery.: Sewerage Systems Design and Managemer
8.4.Urban Waste Management Strategies
8.5.Remediation Activities and Technologies
8.6.Policy and Regulation in Urban Water and Waste
8.7.Climate Change and its Impact on Water and Waste Management
8.8..Sustainable Innovations in Water and Waste Systems
4.1 .12.15..9.1.Transportation and Warehousing in Tourism Planning and Development
9.2..Introduction to Tourism Logistics
9.3..Transportation Infrastructure in Tourism
9.4..Role of Warehousing in Tourism
9.5..Sustainable Transport Solutions
9.6..Tourism Supply Chain Management
9.7.Policy and Regulations in Tourism Transport
9.8.Innovations in Tourism Warehousing
Investigates recent technological advancements in warehousing that support tourism industry needs. 9.8 Innovations in Tourism Warehousing
9.9..Case Studies on Tourism and Logistics
4.1 .12.15.10.1..Spatial Computing in Telecommunications
10.2..Introduction to Spatial Computing
10.3..Spatial Data and Telecommunications
10.4..Geographical Information Systems (GIS) in Telecom
10.5..Network Planning and Optimization Using Spatial Computing
10.6.Spatial Data Analytics for Telecom
10.7..Augmented Reality (AR) in Telecommunication Services
10.11..5G and Spatial Computing
10.12..Privacy and Security in Spatial Telecommunications
4.1 .12.15..11.1..Advanced Legal Studies in Public Administration and Safety
11.2Introduction to Public Law
11.3.Constitutional Law and Governance
11.4.Administrative Law
11.5.Legal Frameworks for Public Safety
11.6..Ethics in Public Administration
11.7..Public Policy and Legal Implications
11.8..Human Rights and Social Justice
11.9.Crisis Management and Legal Compliance
4.1 .12.15..12.1Metallurgy in Oil and Gas Production, Refining, and Transport
12.2..Introduction to Metallurgy in Oil and Gas
12.3..Material Selection for Oil and Gas Production
12.4..Corrosion Mechanisms and Prevention
12.5..Metallurgical Processes in Refining
Discusses how metallurgical processes like heat treatment and welding are utilized in refining operations to enhance material properties. Corrosion Mechanisms and Prevention
12.6..Pipeline Materials and Design
12.7.Advanced Coatings and Surface Treatments
Advanced Coatings and Surface Treatments
12.8.Environmental Impact and Sustainability in Metallurgy
12.9..Failure Analysis and Case Studies
12.10Future Trends in Metallurgy for Oil and Gas
4.1 .12.15..13.1.Integrated Water Management in Mining
13.2.Introduction to Mining Water Management
13.2.Water Resource Evaluation and Planning
13.3.Water Quality Management in Mining
13.4.Regulatory and Environmental Compliance
13.5.Innovation and Technology in Water Management
13.6.Stakeholder Engagement and Social License
13.7..Climate Change Impacts on Water Resources
13.8.Case Studies and Best Practices
13.7.Future Trends in Mining Water Management
3.1 Integrated Water Management in Mining
13.2 Introduction to Mining Water Management
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13.4 Water Quality Management in Mining
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13.6 Innovation and Technology in Water Management
13.7 Stakeholder Engagement and Social License
13.8 Climate Change Impacts on Water Resources
13.9 Case Studies and Best Practices
13.10 Future Trends in Mining Water Management
.4.1 .12.15.14.Integrated Water Management in Mining
14.1.Introduction to Mining Water Management
14.2.Water Resource Evaluation and Planning
14.3Water Quality Management in Mining
14.4.Regulatory and Environmental Compliance
14.5.Innovation and Technology in Water Management
14.6..Stakeholder Engagement and Social License
14.7Climate Change Impacts on Water Resources
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14..9..Future Trends in Mining Water Management
14 Integrated Water Management in Mining
14.1 Introduction to Mining Water Management
14.2 Water Resource Evaluation and Planning
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14.5 Innovation and Technology in Water Management
14.6 Stakeholder Engagement and Social License
14.7 Climate Change Impacts on Water Resources
14.8 Case Studies and Best Practices
14.9 Future Trends in Mining Water Management
4.1 .12.15..15.1.Advanced Manufacturing Techniques in Genetic Engineering
15.2.Introduction to Genetic Engineering
15.3..Manufacturing Processes in Biotechnology
15.4..CRISPR and Advanced Genetic Modification Techniques

15.5.Ethical and Regulatory Considerations
15.6.Biopharmaceutical Manufacturing
15.7.Fermentation Technology
15.8..Scale-Up and Commercialization
15.9.Quality Control in Genetically Engineered Products
15.10.Future Trends in Genetic Engineering Manufacturing
4.1 .12.15..15.1.Advanced Manufacturing Techniques in Genetic Engineering
15.2.Introduction to Genetic Engineering
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15.6.Biopharmaceutical Manufacturing
15.7.Fermentation Technology
15.8..Scale-Up and Commercialization
15.9.Quality Control in Genetically Engineered Products
15.10.Future Trends in Genetic Engineering Manufacturing
4.1 .12.15.16.1.Data Processing and Hosting Services in Computer Engineering
16.2.Introduction to Data Processing
16.3.Cloud Hosting Services
16.4..Big Data Technologies
16.5Data Security in Cloud Hosting
16.6.Containerization and Microservices
16.7Distributed Systems
16.8.Data Warehousing and Analytics
16.9..Serverless Computing
4.1 .12.15..16.1 Data Processing and Hosting Services in Computer Engineering
16.2 Introduction to Data Processing
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16.4 Big Data Technologies
16.5 Data Security in Cloud Hosting
16.6 Containerization and Microservices
16.7 Distributed Systems
16.8 Data Warehousing and Analytics
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4.1 .12.15..17.1.Masters in Cryptocurrency and Blockchain Applications
17.2.Introduction to Blockchain Technology
17.2.Cryptocurrencies: An Overview
17.3.Blockchain Consensus Mechanisms
17.4..Smart Contracts
17.5.Decentralized Finance (DeFi)
17.6.Blockchain in Supply Chain Management
17.7.Regulation and Compliance in Blockchain
17.8.NFTs and Digital Assets
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17.5 Smart Contracts
17.6 Decentralized Finance (DeFi)
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17.8 Regulation and Compliance in Blockchain
17.9 NFTs and Digital Assets
4.1 .12.15.18.1.Advanced Cybersecurity in Bibliotechnology
18.2 Introduction to Cybersecurity in Bibliotechnology
18.3Threats and Vulnerabilities in Digital Libraries
18.4.Data Privacy and Integrity in Bibliotechnology
18.5.Implementing Security Policies for Digital Libraries
18.6.Access Control in Library Networks
18.7.Digital Rights Management in Bibliotechnology
18.8.Network Security Essentials for Digital Libraries
18.9.Incident Response and Recovery for Digital Libraries
18..10Emerging Cybersecurity Technologies in Bibliotechnology
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18.2 Introduction to Cybersecurity in Bibliotechnology
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18.8 Network Security Essentials for Digital Libraries
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19.3.Distributed Computing in Energy Systems
19.4.IoT Applications in Power Systems
19.5.Real-time Data Processing
19.6Security and Privacy in Edge Computing
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19.1 Edge Computing in Modern Power and Energy Systems
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Machine Learning Applications on the Edge
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20.3.Architecture of CPS
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20.6.Machine Learning in CPS
20.7.Real-Time Systems and CPS
20.8.Simulation and Modeling in CPS
20.9..Applications and Case Studies of CPS
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20.4 Networking and Communication in CPS
20.5 CPS Security and Privacy
20.6 Machine Learning in CPS
20.7 Real-Time Systems and CPS
20.8 Simulation and Modeling in CPS
20.9 Applications and Case Studies of CPS
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21.1.
21.2.The Need for Distributed Ledger Technology in Education
21.3.Blockchain for Secure Credentialing
21.4.Smart Contracts in Educational Transactions
21.5..DLT-based Learning Management Systems
Privacy and Data Security in DLT
21.6.Case Studies of DLT in Education
21.7.Future Trends in DLT and EdTech
21.1 Masters in Distributed-Ledger Technology Applications in Educational Technology
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21.5 Smart Contracts in Educational Transactions
21.6 DLT-based Learning Management Systems
21.7 Privacy and Data Security in DLT
21.8 Case Studies of DLT in Education
21.9 Future Trends in DLT and EdTech
4.1 .12.15.22.1.Master's in Adult Education Services
22.1.Introduction to Adult Education
22.2.Theories of Adult Learning
22.3.Curriculum Design for Adult Learners
22.4.Assessment and Evaluation in Adult Education
22.5.Technology Integration in Adult Learning
22.6.Diversity and Inclusion in Adult Education
22.7.Motivational Strategies for Adult Learners
22.8.Professional Development for Adult Educators
22.1 Master's in Adult Education Services
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22.5 Assessment and Evaluation in Adult Education
22.6 Technology Integration in Adult Learning
22.7 Diversity and Inclusion in Adult Education
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22.9 Professional Development for Adult Educators
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22.6.Quantum Programming Languages
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22.8.Challenges and Future of Quantum Computing
22.9.Quantum Supremacy and its Implications
23.1 Quantum Computing in Systems Engineering
23.1 Introduction to Quantum Computing
23.2 Quantum Algorithms
23.3 Quantum Gates and Circuits
23.4 Quantum Information Theory
23.5 Quantum Computing Platforms
23.6 Quantum Programming Languages
23.7 Applications of Quantum Computing in Systems Engineering
23.8 Challenges and Future of Quantum Computing
23.9 Quantum Supremacy and its Implications
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23.3.Introduction to Neurotechnology
23.4.Neuroscience Basics for Educators
23.5.Brain-Computer Interfaces in Education
23.6.Cognitive Load Theory and Neurotechnology
23.7.Neuroscience-Based Adaptive Learning Technologies
23.8.Ethical and Social Implications
23.9.Case Studies in Neurotechnology Education
23.10.Future Trends in Neurotechnology for Education
23.2 Neurotechnology in Educational Technology
23.3 Introduction to Neurotechnology
23.4 Neuroscience Basics for Educators
23.5 Brain-Computer Interfaces in Education
23.6 Cognitive Load Theory and Neurotechnology
23.7 Neuroscience-Based Adaptive Learning Technologies
23.8 Ethical and Social Implications
23.9 Case Studies in Neurotechnology Education
23.10 Future Trends in Neurotechnology for Education
4.1 .12.15.24.1.Robotic Process Automation in Electrochemical Engineering
24.2 Introduction to Robotic Process Automation
24.3.Fundamentals of Electrochemical Engineering
24.4.RPA Tools and Platforms
24.5.Automating Electrochemical Process Controls
24.6.Data Collection and Analysis in Electrochemical Systems
24.7.Machine Learning and RPA in Electrochemical Engineering
24.8.RPA Implementation Challenges and Solutions

24.9.Case Studies and Industry Applications
4.1 Robotic Process Automation in Electrochemical Engineering
24.2 Introduction to Robotic Process Automation
24.3 Fundamentals of Electrochemical Engineering
24.4 RPA Tools and Platforms
24.5 Automating Electrochemical Process Controls
24.6 Data Collection and Analysis in Electrochemical Systems
24.7 Machine Learning and RPA in Electrochemical Engineering
24.8 RPA Implementation Challenges and Solutions
24.9 Case Studies and Industry Applications
4.1 .12.15.25.1.Integrating Educational Technology in Renewable Energy Studies
25.2.Introduction to Renewable Energy
25.3.Educational Technology Tools
25.4.Designing Interactive Learning Modules
25.5.Gamification in Renewable Energy Education
25.6.Virtual Labs and Simulations
25.7.Assessing Learner Outcomes in Technology-Driven Curriculum
25.8.Case Studies in Renewable Energy Education
25.9.Challenges in Integrating Technology and Renewable Energy Education
25.1 Integrating Educational Technology in Renewable Energy Studies
25.2 Introduction to Renewable Energy
25.3 Educational Technology Tools
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25.5 Gamification in Renewable Energy Education
25.6 Virtual Labs and Simulations
25.7 Assessing Learner Outcomes in Technology-Driven Curriculum
25.8 Case Studies in Renewable Energy Education
25.9 Challenges in Integrating Technology and Renewable Energy Education
4.1 .12.15.26.1Wholesale Trade Management in Industrial Engineering
26.2.Introduction to Wholesale Trade
26.3.Supply Chain Dynamics
26.4.Inventory Control Methods
26.5.Logistics and Distribution
26.6.Procurement Strategies
26.7.Market Analysis and Forecasting
27.8.Risk Management in Wholesale Trade
27.9.Regulatory and Ethical Considerations
26.1 Wholesale Trade Management in Industrial Engineering
26.2 Introduction to Wholesale Trade
26.3 Supply Chain Dynamics
26.4 Inventory Control Methods
26.5 Logistics and Distribution
26.6 Procurement Strategies
26.7 Market Analysis and Forecasting
26.8 Risk Management in Wholesale Trade
26.9 Regulatory and Ethical Considerations
4.1 .12.15..29. 1.Advanced Wireless Communications
29.2.Introduction to Wireless Communications
29.3.Radio Frequency Fundamentals
29.4.Wireless Signal Propagation

24.9.Case Studies and Industry Applications
4.1 Robotic Process Automation in Electrochemical Engineering
24.2 Introduction to Robotic Process Automation
24.3 Fundamentals of Electrochemical Engineering
24.4 RPA Tools and Platforms
24.5 Automating Electrochemical Process Controls
24.6 Data Collection and Analysis in Electrochemical Systems
24.7 Machine Learning and RPA in Electrochemical Engineering
24.8 RPA Implementation Challenges and Solutions
24.9 Case Studies and Industry Applications
4.1 .12.15.25.1.Integrating Educational Technology in Renewable Energy Studies
25.2.Introduction to Renewable Energy
25.3.Educational Technology Tools
25.4.Designing Interactive Learning Modules
25.5.Gamification in Renewable Energy Education
25.6.Virtual Labs and Simulations
25.7.Assessing Learner Outcomes in Technology-Driven Curriculum
25.8.Case Studies in Renewable Energy Education
25.9.Challenges in Integrating Technology and Renewable Energy Education
25.1 Integrating Educational Technology in Renewable Energy Studies
25.2 Introduction to Renewable Energy
25.3 Educational Technology Tools
25.4 Designing Interactive Learning Modules
25.5 Gamification in Renewable Energy Education
25.6 Virtual Labs and Simulations
25.7 Assessing Learner Outcomes in Technology-Driven Curriculum
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25.9 Challenges in Integrating Technology and Renewable Energy Education
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26.9 Regulatory and Ethical Considerations
4.1 .12.15..29. 1.Advanced Wireless Communications
29.2.Introduction to Wireless Communications
29.3.Radio Frequency Fundamentals
29.4.Wireless Signal Propagation

29.5.Multiple Access Techniques
29.6.Wireless Networking and Protocols
29.7.Cellular Systems and 5G
29.8.. Antenna Theory and Design
29.8Wireless Security
29.6IoT and Wireless Sensor Networks
29.1 Advanced Wireless Communications
29.2 Introduction to Wireless Communications
29.3 Radio Frequency Fundamentals
29.4 Wireless Signal Propagation
29.5 Multiple Access Techniques
29.6 Wireless Networking and Protocols
29.7 Cellular Systems and 5G
29.8 Antenna Theory and Design
29.9 Wireless Security
29.10 IoT and Wireless Sensor Networks
4.1 .12.15.30.1.Advanced Electrical Engineering in Construction and Civil Engineering
30.2. Fundamentals of Electrical Systems in Construction
30.3.Electrical Safety Standards and Codes
30.4.Integration of Electrical Systems in Building Design
30.5Sustainable and Renewable Energy Technologies
30.6.Smart Grids and Intelligent Networks
30.7.Electrical System Design and Simulation
30.8.Power Quality and Energy Management
30.9.Electrical Systems in Infrastructure Projects
Advanced Electrical Engineering in Construction and Civil Engineering
30.2 Fundamentals of Electrical Systems in Construction
30.3 Electrical Safety Standards and Codes
30.4 Integration of Electrical Systems in Building Design
30.5 Sustainable and Renewable Energy Technologies
30.6 Smart Grids and Intelligent Networks
30.7 Electrical System Design and Simulation
30.8 Power Quality and Energy Management
30.9 Electrical Systems in Infrastructure Projects
4.1 .12.15.Electrical Systems in Construction and Civil Engineering
Introduction to Electrical Systems in Construction
Power Distribution in Buildings
Lighting Systems and Design
Electrical Safety Standards and Regulations
Sustainability in Electrical Engineering
Smart Buildings and IoT Integration
Electrical Load Analysis and Estimation
Integration of Renewable Energy Sources
Project Management in Electrical Engineering
4.1 .12.15.30.1.Doctorate in Specialist Engineering Infrastructure and Contractors: Electrical Engineering
30.2.Advanced Power System Analysis
30.3Renewable Energy Systems
30.4.Electrical Infrastructure Design and Management
31.5.Smart Grids and IoT Applications
31.6.. High Voltage Engineering

31.7.Project Management in Electrical Engineering
31.8Energy Policy and Ethical Considerations
31.1Sustainable Electrical Engineering Practices
30.1 Doctorate in Specialist Engineering Infrastructure and Contractors: Electrical Engineering
30.2 Advanced Power System Analysis
30.3 Renewable Energy Systems
30.4 Electrical Infrastructure Design and Management
31.5 Smart Grids and IoT Applications
31.6 High Voltage Engineering
31.7 Project Management in Electrical Engineering
31.8 Energy Policy and Ethical Considerations
31.9 Sustainable Electrical Engineering Practices
Admission Ready - Completing your application - Atlantic International University
32.Topic
4.1 .12.15..32.1Clean Energy Technology: Ecotechnology Applications
32.3.Introduction to Clean Energy and Ecotechnology
32.4.Solar Energy Technologies
32.5.Wind Energy Systems
32.6.Bioenergy and Biomass
32.7.Hydropower and Ocean Energy
32.8.Geothermal Energy
32.9.Energy Storage and Smart Grids
32.10.Policy and Economics of Clean Energy
32.11Ecological Impact of Renewable Energy
32.12.Future Directions in Clean Energy and Ecotechnology
2.1 Clean Energy Technology: Ecotechnology Applications
32.3 Introduction to Clean Energy and Ecotechnology
32.4 Solar Energy Technologies
32.5 Wind Energy Systems
32.6 Bioenergy and Biomass
32.7 Hydropower and Ocean Energy
32.8 Geothermal Energy
32.9 Energy Storage and Smart Grids
32.10 Policy and Economics of Clean Energy
32.11 Ecological Impact of Renewable Energy
32.12 Future Directions in Clean Energy and Ecotechnology
33.Topics
4.1 .12.15.33.1Integration of Electronic Engineering in Construction and Civil Engineering
33.2.Introduction to Electronic Systems in Civil Engineering
33.3.Smart Construction Technologies
33.4.IoT in Infrastructure Management
33.5.Electronic Monitoring and Control Systems
33.6.Automation in Construction Machinery
33.7.Solar and Renewable Energy Systems in Civil Engineering
33.8.Building Information Modeling (BIM) and Electronic Systems
33.9.Cybersecurity in Smart Infrastructure
33.1 Integration of Electronic Engineering in Construction and Civil Engineering
33.2 Introduction to Electronic Systems in Civil Engineering
33.3 Smart Construction Technologies
33.4 IoT in Infrastructure Management

33.5 Electronic Monitoring and Control Systems
33.6 Automation in Construction Machinery
33.7 Solar and Renewable Energy Systems in Civil Engineering
33.8 Building Information Modeling (BIM) and Electronic Systems
33.9 Cybersecurity in Smart Infrastructure
34.1.Topic
4.1 .12.15..34.2.Masters in Immutable Data Storage Solutions for Web Design
34.3.Introduction to Immutable Data
33.4.Immutable Data Structures
33.5.Immutable.js and Alternatives
33.6.State Management with Immutable Data
33.7.Performance Benefits of Immutable Data
33.8.GraphQL and Immutable Data
33.9.Immutable Data in Server-Side Rendering (SSR)
33.10.Security and Immutable Data
33.11.Future Trends in Immutable Data
Masters in Immutable Data Storage Solutions for Web Design
34.2 Introduction to Immutable Data
34.3 Immutable Data Structures
34.4
34.Topic
4.1 .12.15.34.1.Masters in Immutable Data Storage Solutions for Web Design
34.2.Introduction to Immutable Data
34.3.Immutable Data Structures
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34.6.GraphQL and Immutable Data
34.7.Immutable Data in Server-Side Rendering (SSR)
34.8.Security and Immutable Data
34.9.Future Trends in Immutable Data
34.1 Masters in Immutable Data Storage Solutions for Web Design
34.2 Introduction to Immutable Data
34.3 Immutable Data Structures
34.4
35.1.Topic
4.1 .12.15..35.2.Advanced Cyber-Physical Systems in Telecommunications
35.3.Introduction to Cyber-Physical Systems
35.4.Network Architecture in CPS
35.5..IoT and Cyber-Physical Systems
35.6.Security and Privacy in CPS
35.7.Real-time Data Processing and Analytics
35.8.Machine Learning in Cyber-Physical Systems
35.9.Emerging Trends in CPS and Telecommunications
35.10.CPS Case Studies in Telecommunications
35.2 Advanced Cyber-Physical Systems in Telecommunications
35.3 Introduction to Cyber-Physical Systems
35.4 Network Architecture in CPS
35.5 IoT and Cyber-Physical Systems
35.6 Security and Privacy in CPS
35.7 Real-time Data Processing and Analytics
35.8 Machine Learning in Cyber-Physical Systems
35.9 Emerging Trends in CPS and Telecommunications
35.10 CPS Case Studies in Telecommunications

36
37
4.1 .12.15..36.1.Introduction to Artificial Intelligence and Machine Learning
36.2.Data Preprocessing and Feature Engineering
36.3.Supervised Learning Techniques
36.4.Unsupervised Learning and Clustering
36.5.Deep Learning and Neural Networks
36.6.Natural Language Processing
36.7.AI/ML in Software Development Lifecycle
36.8.Ethical and Responsible AI
36.8.Deployment and Scaling of AI Solutions
37.1 Master's Program in Artificial Intelligence and Machine Learning for Software Engineering
37.2 Introduction to Artificial Intelligence and Machine Learning
37.3 Data Preprocessing and Feature Engineering
37.4 Supervised Learning Techniques
37.5 Unsupervised Learning and Clustering
37.6 Deep Learning and Neural Networks
37.7 Natural Language Processing
37.8 AI/ML in Software Development Lifecycle
37.9 Ethical and Responsible AI
37.10 Deployment and Scaling of AI Solutions
37..Topics:
4.1 .12.15.37.1.Advanced Studies in Autonomous Vehicles and Drones for Electric Vehicle Engineering
37.1.Introduction to Autonomous Systems
37.2 Electric Vehicle Engineering Basics
37.3.Sensor Technologies and Data Processing
37.4.Machine Learning and AI for Autonomous Systems
37.5.Communication Networks and IoT
37.6.Control Systems for Autonomous Vehicles
37.7 Ethical and Regulatory Aspects
37.8.Testing and Validation of Autonomous Systems
37.9.Integration of Renewable Energy in Autonomous Systems
37.1 Advanced Studies in Autonomous Vehicles and Drones for Electric Vehicle Engineering
37.2 Introduction to Autonomous Systems
37.3 Electric Vehicle Engineering Basics
37.4 Sensor Technologies and Data Processing
37.5 Machine Learning and AI for Autonomous Systems
37.6 Communication Networks and IoT
37.7 Control Systems for Autonomous Vehicles
37.8 Ethical and Regulatory Aspects
37.9 Testing and Validation of Autonomous Systems
37.10 Integration of Renewable Energy in Autonomous Systems
38.1.topics
4.1 .12.15.38.2:Specialist Engineering in Infrastructure and Contractors: Electrochemical Engineering
38.3.Introduction to Electrochemical Engineering

38.4.Battery Technologies for Infrastructure
38.5.Fuel Cells and Their Applications
38.6.and Its Prevention
38.7..Electrochemical Sensors and Monitoring
38.8.Electrolysis and Industrial Processes
38.9.Sustainability and Electrochemical Engineering
.38.10.Advanced Topics in Electrochemical Engineering
38.2 Specialist Engineering in Infrastructure and Contractors: Electrochemical Engineering
38.3 Introduction to Electrochemical Engineering
38.4 Battery Technologies for Infrastructure
38.5 Fuel Cells and Their Applications
38.6 Corrosion and Its Prevention
38.7 Electrochemical Sensors and Monitoring
38.8 Electrolysis and Industrial Processes
38.9 Sustainability and Electrochemical Engineering
38.10 Advanced Topics in Electrochemical Engineering
4.1 .12.15..40.1Topics:Energy Storage and Battery Technology
40.2.Introduction to Energy Storage Systems
40.3.Battery Chemistry and Physics
40.4.Design and Functionality of Battery Cells
40.5.Applications of Battery Storage
40.6.Efficiency and Performance Measurements
40.7.Safety and Environmental Impacts
40.8.Advanced Energy Storage Technologies
40.9.Policy and Economics of Energy Storage
40.10.Future Trends in Battery Technology
41.1.Topics:
41.2.Advanced Robotic Process Automation in Electrical Engineering
41.3.Introduction to Robotic Process Automation
41.4.RPA Tools and Technologies
41.5.Automating Electrical Design Processes
41.6.Data Migration and Management
41.7.RPA in Control Systems
41.8.Machine Learning and RPA
41.9.RPA and IoT in Electrical Systems
41.10.Security and Ethics in RPA
1.2 Advanced Robotic Process Automation in Electrical Engineering
41.3 Introduction to Robotic Process Automation
41.4 RPA Tools and Technologies
41.5 Automating Electrical Design Processes
41.6 Data Migration and Management
41.7 RPA in Control Systems
41.8 Machine Learning and RPA
41.9 RPA and IoT in Electrical Systems
41.10 Security and Ethics in RPA
44..1. Define the Problem
2. Develop the Mathematical Model
3. Simplify the Equations
4. Analytical Solution (if possible)
5. Numerical Solution (if necessary)
6. Simulation and Validation
7. Optimization (if applicable)
Example Calculation: Load Flow Analysis in Power Systems
1. Circuit Analysis
2. Electromagnetics
3. Signal Processing
4. Control Systems
5. Power Systems
6. Electronics
7. Digital Systems
8. Communication Systems
9. Renewable Energy Systems
1. Circuit Analysis
2. Electromagnetics
3. Signal Processing
4. Control Systems
5. Power Systems
6. Electronics
7. Digital Systems
8. Communication Systems
9. Renewable Energy Systems
. Circuit Design and Analysis
2. Power Systems Engineering
3. Control Systems
4. Communication Systems
5. Electronics and Semiconductor Design
6. Renewable Energy Systems
7. Building and Infrastructure
8. Biomedical Engineering
1. Signal Processing
2. Communication Systems
3. Information Theory
4. Network Theory
5. Electromagnetic Theory
6. Digital Communication
1. Signal Processing
2. Communication Systems
3. Information Theory
4. Network Theory
5. Electromagnetic Theory
6. Digital Communication
Practical Examples:
IoT (Internet of Things)
Solar Power Systems
Wind Energy Projects
Communication Systems Calculations
1. MIMO (Multiple Input Multiple Output) Systems
2. Satellite Communication
3. Optical Fiber Communication
4. IoT (Internet of Things)

Ancient Times
System Design and Operation
Battery Technologies for Infrastructure
34.6 Performance Benefits of Immutable Data
38.7 Electrochemical Sensors and Monitoring
38.8 Electrolysis and Industrial Processes
38.9 Sustainability and Electrochemical Engineering
5. Automating Electrical Design Processes
Integral and Derivative Calculations in Automating Electrical Design Processes
Project Management in Electrical Engineering
Integral and Derivative Calculations in Project Management
Wind Energy, Solar Energy, and Hydroelectric Power
Electrical Infrastructure Design and Management
Smart Grids and IoT Applications
Understanding the Basic Concepts of Social Media Marketing
Television and Radio Production Essentials
Roberto Aldrett - AIU
Career Coach
Life-Coach Consulting
The Future Of Science and Engineering
The Constantly Changing Education Landscape
Academic Freedom to Discover Your Purpose Open Curriculum Design at Atlantic International University
Core Courses and Topics in Engineering Systems:
Orientation Courses:
Research Project in Engineering Systems:
Academic Freedom to Discover Your Purpose Open Curriculum Design at Atlantic International University
Core Courses and Topics in Engineering Systems:
Orientation Courses:
Research Project in Engineering Systems:
Academic Freedom to Discover Your Purpose Open Curriculum Design at Atlantic International University
Core Courses and Topics in Engineering Systems:
Orientation Courses:
Research Project in Engineering Systems:
Student name : tshingombe tshitadi
1 topics :
1 AGI in Human-Machine Collaboration
Future Scenarios of AGI Development
1.10nline Retail and E-commerce in the Renewable Energy Sector
1.2 Introduction to E-commerce in the Renewable Energy Sector
1.3 Understanding the Renewable Energy Market
Targeted, flexible and co-ordinated policies can unlock the potential of e-commerce
1.4. E-commerce Strategies for Renewable Energy Products
1.4 Consumer Behavior in Online Retail
3.1 Electric power B2B descriptions
3.2 Notations
1.5 Digital Marketing for Renewable Energy E-commerce
1.6. Sustainable Practices in E-commerce
1.7 Case Studies in Renewable Energy E-commerce:
3.3 Fusion of behavioral data
3.4 Fusion of item attribute information
3.5 Fusion of behavioral data and item information
1.8 Regulatory Environment for Online Retail in Renewable Energy:
Experiments and discussion
4.1 Data descriptions
1.9 Future Trends in Online Retail and Renewable Energy
Future Research Frontiers in AI for the E-commerce Sector
2.1Publishing and Natural Resources Management:
2.2 Introduction to Sustainable Natural Resources Management:
This topic covers the fundamental principles of sustainable natural resource management and its importance for future generations. Challenges in natural resource management for ecological sustainability
2.3.1 Resource planning strategy and ownership regime
2.3 The Role of Publishing in Sustainability:
2.4 Environmental Journalism and Communication
2.5 Digital Publishing and New Media
2.6 Content Creation for Natural Resource Management
2.2. New journals on SDG-relevant topics
2.8 Sustainable Practices in Publishing:
2.9. Case Studies in Effective Sustainability Communication:
3.3. Equity recommended
4. Translating research into practice
4.1. Cognitive accessibility
3.1 Masters in Supply Chain Management and Traceability
3.2 Introduction to Supply Chain Management
between functions within their own companies, but also with other An Introduction to Supply Chain Management
3.3. Principles of Traceability
3.4 Software Engineering Basics:
3.5 Supply Chain Digitalization
3.6 Data Management in Supply Chains
3.7 Blockchain for Supply Chain Traceability
IoT and Smart Supply Chains
3.8 Security and Privacy in Supply Chain Software:
3.9 Case Studies and Real-world Applications
4.1 Social Media Marketing for Real Estate, Rental, and Leasing
4.1 Social Media Marketing for Real Estate, Rental, and Leasing
4.2 Introduction to Social Media Marketing
4.2 Introduction to Social Media Marketing
Understanding the basic concepts of social media marketing and its importance in the real estate, rental, and leasing sectors.: Understanding the Basic Concepts of Social Media Marketing
Importance of Social Media Marketing in Real Estate, Rental, and Leasing
4.3 Target Audience Analysis
4.4 Content Creation for Real Estate
Strategies for creating compelling content that attracts and retains the interest of potential clients on social media.: Target Audience Analysis for Real Estate, Rental, and Leasing on Social Media
4.5 Platform-Specific Strategies:
Learning to tailor marketing strategies for different social media platforms such as Facebook, Instagram, and LinkedIn.: Platform-Specific Strategies for Social Media Marketing
4.6 Social Media Advertising:
Engagement and Community Building:
Metrics and Analytics: Engagement and Community Building
Case Studies and Best Practices
4.6 Case Studies and Best Practices
5.1 Advanced Telemedicine and Remote Healthcare Production
5.2 Introduction to Telemedicine and Remote Healthcare: Advanced Telemedicine and Remote Healthcare Production

5.4 Medical Narrative and Storytelling
Crafting compelling stories that communicate complex healthcare concepts effectively to a diverse audience.: 5.3 Television and Radio Production Essentials
5.6 Remote Healthcare Technologies and Innovations:
5.9 Audience Engagement and Feedback in Healthcare Broadcasting
5.11 Future Trends in Telemedicine and Media Integration
6.1 Technical Writing for Technology
6.2 Introduction to Technical Writing
6.3 Understanding Your Audience:
6.9 Editing and Proofreading: Editing and Proofreading
6.10 Ethics in Technical Writing
6.10 Ethics in Technical Writing
6.12 Effective Communication in Teams
7.1.Masters in Vertical Farming and Urban Agriculture with Focus on Synthetic Biology
7.2Introduction to Vertical Farming and Urban Agriculture
7.3.Fundamentals of Synthetic Biology
Study the basic principles of synthetic biology, including DNA sequencing, genetic engineering, and how these tools are used to optimize plant growth.: Fundamentals of Synthetic Biology
7.4..Applications of Synthetic Biology in Urban Agriculture
7.6Design of Vertical Farming Systems
7.7Integration of Biotechnology in Crop Production
7.8.Environmental and Economic Impacts of Urban Agriculture
7.9.Regulatory and Ethical Considerations in Synthetic Biology
7.10Future Trends in Vertical Farming and Synthetic Biology
8.Master's in Urban Water Supply, Sewerage, Waste Management, and Remediation Activities
8.2.Introduction to Urban Water Supply Systems
8.3 Sewerage Systems Design and Manage
8.3.Sewerage Systems Design and Management
Learn about the engineering, design, and operational management of urban sewerage systems, focusing on sustainable practices and innovations in waste treatment and resource recovery.: Sewerage Systems Design and Managemer
8.4.Urban Waste Management Strategies
8.5.Remediation Activities and Technologies
8.6.Policy and Regulation in Urban Water and Waste
8.7.Climate Change and its Impact on Water and Waste Management
8.8..Sustainable Innovations in Water and Waste Systems
9.1.Transportation and Warehousing in Tourism Planning and Development
9.2..Introduction to Tourism Logistics
9.3...Transportation Infrastructure in Tourism
9.4..Role of Warehousing in Tourism
9.5..Sustainable Transport Solutions
9.6..Tourism Supply Chain Management
9.7.Policy and Regulations in Tourism Transport
9.8.Innovations in Tourism Warehousing
Investigates recent technological advancements in warehousing that support tourism industry needs. 9.8 Innovations in Tourism Warehousing
9.9..Case Studies on Tourism and Logistics
10.1..Spatial Computing in Telecommunications
10.2..Introduction to Spatial Computing
10.3..Spatial Data and Telecommunications
10.4..Geographical Information Systems (GIS) in Telecom
10.5..Network Planning and Optimization Using Spatial Computing
10.6.Spatial Data Analytics for Telecom
10.7..Augmented Reality (AR) in Telecommunication Services
10.11..5G and Spatial Computing

10.12..Privacy and Security in Spatial Telecommunications
11.1..Advanced Legal Studies in Public Administration and Safety
11.2Introduction to Public Law
11.3.Constitutional Law and Governance
11.4.Administrative Law
11.5.Legal Frameworks for Public Safety
11.6..Ethics in Public Administration
11.7..Public Policy and Legal Implications
11.8..Human Rights and Social Justice
11.9.Crisis Management and Legal Compliance
12.1Metallurgy in Oil and Gas Production, Refining, and Transport
12.2..Introduction to Metallurgy in Oil and Gas
12.3..Material Selection for Oil and Gas Production
12.4..Corrosion Mechanisms and Prevention
12.5..Metallurgical Processes in Refining
Discusses how metallurgical processes like heat treatment and welding are utilized in refining operations to enhance material properties. Corrosion Mechanisms and Prevention
12.6..Pipeline Materials and Design
12.7.Advanced Coatings and Surface Treatments
Advanced Coatings and Surface Treatments
12.8.Environmental Impact and Sustainability in Metallurgy
12.9..Failure Analysis and Case Studies
12.10Future Trends in Metallurgy for Oil and Gas
13.1.Integrated Water Management in Mining
13.2.Introduction to Mining Water Management
13.2.Water Resource Evaluation and Planning
13.3.Water Quality Management in Mining
13.4.Regulatory and Environmental Compliance
13.5.Innovation and Technology in Water Management
13.6.Stakeholder Engagement and Social License
13.7..Climate Change Impacts on Water Resources
13.8.Case Studies and Best Practices
13.7.Future Trends in Mining Water Management
3.1 Integrated Water Management in Mining
13.2 Introduction to Mining Water Management
13.3 Water Resource Evaluation and Planning
13.4 Water Quality Management in Mining
13.5 Regulatory and Environmental Compliance
13.6 Innovation and Technology in Water Management
13.7 Stakeholder Engagement and Social License
13.8 Climate Change Impacts on Water Resources
13.9 Case Studies and Best Practices
13.10 Future Trends in Mining Water Management
14.Integrated Water Management in Mining
14.1.Introduction to Mining Water Management
14.2.Water Resource Evaluation and Planning
14.3Water Quality Management in Mining
14.4.Regulatory and Environmental Compliance
14.5.Innovation and Technology in Water Management
14.6..Stakeholder Engagement and Social License
14.7Climate Change Impacts on Water Resources

14.8..Case Studies and Best Practices
14..9..Future Trends in Mining Water Management
14 Integrated Water Management in Mining
14.1 Introduction to Mining Water Management
14.2 Water Resource Evaluation and Planning
14.3 Water Quality Management in Mining
14.4 Regulatory and Environmental Compliance
14.5 Innovation and Technology in Water Management
14.6 Stakeholder Engagement and Social License
14.7 Climate Change Impacts on Water Resources
14.8 Case Studies and Best Practices
14.9 Future Trends in Mining Water Management
15.1.Advanced Manufacturing Techniques in Genetic Engineering
15.2.Introduction to Genetic Engineering
15.3..Manufacturing Processes in Biotechnology
15.4..CRISPR and Advanced Genetic Modification Techniques
15.5.Ethical and Regulatory Considerations
15.6.Biopharmaceutical Manufacturing
15.7.Fermentation Technology
15.8..Scale-Up and Commercialization
15.9.Quality Control in Genetically Engineered Products
15.10.Future Trends in Genetic Engineering Manufacturing
15.1.Advanced Manufacturing Techniques in Genetic Engineering
15.2.Introduction to Genetic Engineering
15.3..Manufacturing Processes in Biotechnology
15.4..CRISPR and Advanced Genetic Modification Techniques
15.5.Ethical and Regulatory Considerations
15.6.Biopharmaceutical Manufacturing
15.7.Fermentation Technology
15.8..Scale-Up and Commercialization
15.9.Quality Control in Genetically Engineered Products
15.10.Future Trends in Genetic Engineering Manufacturing
16.1.Data Processing and Hosting Services in Computer Engineering
16.2.Introduction to Data Processing
16.3.Cloud Hosting Services
16.4..Big Data Technologies
16.5Data Security in Cloud Hosting
16.6.Containerization and Microservices
16.7Distributed Systems
16.8.Data Warehousing and Analytics
16.9..Serverless Computing
16.1 Data Processing and Hosting Services in Computer Engineering
16.2 Introduction to Data Processing
16.3 Cloud Hosting Services
16.4 Big Data Technologies
16.5 Data Security in Cloud Hosting
16.6 Containerization and Microservices
16.7 Distributed Systems
16.8 Data Warehousing and Analytics
16.9 Serverless Computing
17.1.Masters in Cryptocurrency and Blockchain Applications
17.2.Introduction to Blockchain Technology
17.2.Cryptocurrencies: An Overview
17.3.Blockchain Consensus Mechanisms
17.4..Smart Contracts
17.5.Decentralized Finance (DeFi)
17.6.Blockchain in Supply Chain Management
17.7.Regulation and Compliance in Blockchain
17.8.NFTs and Digital Assets
17.1 Masters in Cryptocurrency and Blockchain Applications
17.2 Introduction to Blockchain Technology
17.3 Cryptocurrencies: An Overview
17.4 Blockchain Consensus Mechanisms
17.5 Smart Contracts
17.6 Decentralized Finance (DeFi)
17.7 Blockchain in Supply Chain Management
17.8 Regulation and Compliance in Blockchain
17.9 NFTs and Digital Assets
18.1.Advanced Cybersecurity in Bibliotechnology
18.2.Introduction to Cybersecurity in Bibliotechnology
18.3Threats and Vulnerabilities in Digital Libraries
18.4.Data Privacy and Integrity in Bibliotechnology
18.5.Implementing Security Policies for Digital Libraries
18.6.Access Control in Library Networks
18.7.Digital Rights Management in Bibliotechnology
18.8.Network Security Essentials for Digital Libraries
18.9.Incident Response and Recovery for Digital Libraries
18..10Emerging Cybersecurity Technologies in Bibliotechnology
18.1 Advanced Cybersecurity in Bibliotechnology
18.2 Introduction to Cybersecurity in Bibliotechnology
18.3 Threats and Vulnerabilities in Digital Libraries
18.4 Data Privacy and Integrity in Bibliotechnology
18.5 Implementing Security Policies for Digital Libraries
18.6 Access Control in Library Networks
18.7 Digital Rights Management in Bibliotechnology
18.8 Network Security Essentials for Digital Libraries
18.9 Incident Response and Recovery for Digital Libraries
18.10 Emerging Cybersecurity Technologies in Bibliotechnology
19.1.1Edge Computing in Modern Power and Energy Systems
19.2..Introduction to Edge Computing
19.3.Distributed Computing in Energy Systems
19.4.IoT Applications in Power Systems
19.5.Real-time Data Processing
19.6Security and Privacy in Edge Computing
19.6.Edge Analytics for Energy Management
19.7.Energy Efficiency Optimization
19.8.Case Studies on Edge Computing in Energy
19.9.Future Trends in Edge Computing for Energy Systems
19.1 Edge Computing in Modern Power and Energy Systems
19.2 Introduction to Edge Computing

19.3 Distributed Computing in Energy Systems
19.4 IoT Applications in Power Systems
19.5 Real-time Data Processing
19.6 Security and Privacy in Edge Computing
19.7 Edge Analytics for Energy Management
19.8 Energy Efficiency Optimization
19.9 Case Studies on Edge Computing in Energy
19.10 Future Trends in Edge Computing for Energy Systems
Edge Computing for Modern Power and Energy Systems
Introduction to Edge Computing
Role of Edge Computing in Smart Grids
Edge Computing for Renewable Energy Integration
Data Management and Security in Edge Computing
Machine Learning Applications on the Edge
Case Studies in Edge Computing for Energy Systems
Challenges and Future Trends
20.1.Masters in Cyber-Physical Systems and Information Technology
20.2.Introduction to Cyber-Physical Systems
20.3.Architecture of CPS
20.4Networking and Communication in CPS
20.5.CPS Security and Privacy
20.6.Machine Learning in CPS
20.7.Real-Time Systems and CPS
20.8.Simulation and Modeling in CPS
20.9.. Applications and Case Studies of CPS
20.1 Masters in Cyber-Physical Systems and Information Technology
20.2 Introduction to Cyber-Physical Systems
20.3 Architecture of CPS
20.4 Networking and Communication in CPS
20.5 CPS Security and Privacy
20.6 Machine Learning in CPS
20.7 Real-Time Systems and CPS
20.8 Simulation and Modeling in CPS
20.9 Applications and Case Studies of CPS
21.1.Masters in Distributed-Ledger Technology Applications in Educational Technology
21.1..
21.2.The Need for Distributed Ledger Technology in Education
21.3.Blockchain for Secure Credentialing
21.4.Smart Contracts in Educational Transactions
21.5.. DLT-based Learning Management Systems
Privacy and Data Security in DLT
21.6.Case Studies of DLT in Education
21.7.Future Trends in DLT and EdTech
21.1 Masters in Distributed-Ledger Technology Applications in Educational Technology
21.2 Introduction to Distributed Ledger Technology
21.3 The Need for Distributed Ledger Technology in Education
21.4 Blockchain for Secure Credentialing
21.5 Smart Contracts in Educational Transactions
21.6 DLT-based Learning Management Systems
21.8 Case Studies of DLT in Education
21.9 Future Trends in DLT and EdTech
22.1.Master's in Adult Education Services
22.1.Introduction to Adult Education
22.2.Theories of Adult Learning
22.3.Curriculum Design for Adult Learners
22.4.Assessment and Evaluation in Adult Education
22.5.Technology Integration in Adult Learning
22.6.Diversity and Inclusion in Adult Education
22.7.Motivational Strategies for Adult Learners
22.8.Professional Development for Adult Educators
22.1 Master's in Adult Education Services
22.2 Introduction to Adult Education
22.3 Theories of Adult Learning
22.4 Curriculum Design for Adult Learners
22.5 Assessment and Evaluation in Adult Education
22.6 Technology Integration in Adult Learning
22.7 Diversity and Inclusion in Adult Education
22.8 Motivational Strategies for Adult Learners
22.9 Professional Development for Adult Educators
23.1Quantum Computing in Systems Engineering
23.1.Introduction to Quantum Computing
23.2.Quantum Algorithms
22.3.Quantum Gates and Circuits
22.4.Quantum Information Theory
22.5.Quantum Computing Platforms
22.6.Quantum Programming Languages
22.7.Applications of Quantum Computing in Systems Engineering
22.8.Challenges and Future of Quantum Computing
22.9.Quantum Supremacy and its Implications
23.1 Quantum Computing in Systems Engineering
23.1 Introduction to Quantum Computing
23.2 Quantum Algorithms
23.3 Quantum Gates and Circuits
23.4 Quantum Information Theory
23.5 Quantum Computing Platforms
23.6 Quantum Programming Languages
23.7 Applications of Quantum Computing in Systems Engineering
23.8 Challenges and Future of Quantum Computing
23.9 Quantum Supremacy and its Implications
23.2.Neurotechnology in Educational Technology
23.3.Introduction to Neurotechnology
23.4.Neuroscience Basics for Educators
23.5.Brain-Computer Interfaces in Education
23.6.Cognitive Load Theory and Neurotechnology
23.7.Neuroscience-Based Adaptive Learning Technologies
23.8.Ethical and Social Implications
23.9.Case Studies in Neurotechnology Education
23.10.Future Trends in Neurotechnology for Education

23.3 Introduction to Neurotechnology
23.4 Neuroscience Basics for Educators
23.5 Brain-Computer Interfaces in Education
23.6 Cognitive Load Theory and Neurotechnology
23.7 Neuroscience-Based Adaptive Learning Technologies
23.8 Ethical and Social Implications
23.9 Case Studies in Neurotechnology Education
23.10 Future Trends in Neurotechnology for Education
24.1.Robotic Process Automation in Electrochemical Engineering
24.2.Introduction to Robotic Process Automation
24.3.Fundamentals of Electrochemical Engineering
24.4.RPA Tools and Platforms
24.5.Automating Electrochemical Process Controls
24.6.Data Collection and Analysis in Electrochemical Systems
24.7.Machine Learning and RPA in Electrochemical Engineering
24.8.RPA Implementation Challenges and Solutions
24.9.Case Studies and Industry Applications
4.1 Robotic Process Automation in Electrochemical Engineering
24.2 Introduction to Robotic Process Automation
24.3 Fundamentals of Electrochemical Engineering
24.4 RPA Tools and Platforms
24.5 Automating Electrochemical Process Controls
24.6 Data Collection and Analysis in Electrochemical Systems
24.7 Machine Learning and RPA in Electrochemical Engineering
24.8 RPA Implementation Challenges and Solutions
24.9 Case Studies and Industry Applications
25.1.Integrating Educational Technology in Renewable Energy Studies
25.2.Introduction to Renewable Energy
25.3.Educational Technology Tools
25.4.Designing Interactive Learning Modules
25.5.Gamification in Renewable Energy Education
25.6.Virtual Labs and Simulations
25.7.Assessing Learner Outcomes in Technology-Driven Curriculum
25.8.Case Studies in Renewable Energy Education
25.9.Challenges in Integrating Technology and Renewable Energy Education
25.1 Integrating Educational Technology in Renewable Energy Studies
25.2 Introduction to Renewable Energy
25.3 Educational Technology Tools
25.4 Designing Interactive Learning Modules
25.5 Gamification in Renewable Energy Education
25.6 Virtual Labs and Simulations
25.7 Assessing Learner Outcomes in Technology-Driven Curriculum
25.8 Case Studies in Renewable Energy Education
25.9 Challenges in Integrating Technology and Renewable Energy Education
26.1 Wholesale Trade Management in Industrial Engineering
26.2.Introduction to Wholesale Trade
26.3.Supply Chain Dynamics
26.4.Inventory Control Methods
26.5.Logistics and Distribution
26.7.Market Analysis and Forecasting
27.8.Risk Management in Wholesale Trade
27.9.Regulatory and Ethical Considerations
26.1 Wholesale Trade Management in Industrial Engineering
26.2 Introduction to Wholesale Trade
26.3 Supply Chain Dynamics
26.4 Inventory Control Methods
26.5 Logistics and Distribution
26.6 Procurement Strategies
26.7 Market Analysis and Forecasting
26.8 Risk Management in Wholesale Trade
26.9 Regulatory and Ethical Considerations
29. 1.Advanced Wireless Communications
29.2.Introduction to Wireless Communications
29.3.Radio Frequency Fundamentals
29.4.Wireless Signal Propagation
29.5.Multiple Access Techniques
29.6.Wireless Networking and Protocols
29.7.Cellular Systems and 5G
29.8..Antenna Theory and Design
29.8Wireless Security
29.6IoT and Wireless Sensor Networks
29.1 Advanced Wireless Communications
29.2 Introduction to Wireless Communications
29.3 Radio Frequency Fundamentals
29.4 Wireless Signal Propagation
29.5 Multiple Access Techniques
29.6 Wireless Networking and Protocols
29.7 Cellular Systems and 5G
29.8 Antenna Theory and Design
29.9 Wireless Security
29.10 IoT and Wireless Sensor Networks
30.1.Advanced Electrical Engineering in Construction and Civil Engineering
30.2. Fundamentals of Electrical Systems in Construction
30.3.Electrical Safety Standards and Codes
30.4.Integration of Electrical Systems in Building Design
30.5Sustainable and Renewable Energy Technologies
30.6.Smart Grids and Intelligent Networks
30.7.Electrical System Design and Simulation
30.8.Power Quality and Energy Management
30.9.Electrical Systems in Infrastructure Projects
Advanced Electrical Engineering in Construction and Civil Engineering
30.2 Fundamentals of Electrical Systems in Construction
30.3 Electrical Safety Standards and Codes
30.4 Integration of Electrical Systems in Building Design
30.5 Sustainable and Renewable Energy Technologies
30.6 Smart Grids and Intelligent Networks
30.7 Electrical System Design and Simulation
30.8 Power Quality and Energy Management

Electrical Systems in Construction and Civil Engineering
Introduction to Electrical Systems in Construction
Power Distribution in Buildings
Lighting Systems and Design
Electrical Safety Standards and Regulations
Sustainability in Electrical Engineering
Smart Buildings and IoT Integration
Electrical Load Analysis and Estimation
Integration of Renewable Energy Sources
Project Management in Electrical Engineering
30.1.Doctorate in Specialist Engineering Infrastructure and Contractors: Electrical Engineering
30.2.Advanced Power System Analysis
30.3Renewable Energy Systems
30.4.Electrical Infrastructure Design and Management
31.5.Smart Grids and IoT Applications
31.6..High Voltage Engineering
31.7.Project Management in Electrical Engineering
31.8Energy Policy and Ethical Considerations
31.1Sustainable Electrical Engineering Practices
30.1 Doctorate in Specialist Engineering Infrastructure and Contractors: Electrical Engineering
30.2 Advanced Power System Analysis
30.3 Renewable Energy Systems
30.4 Electrical Infrastructure Design and Management
31.5 Smart Grids and IoT Applications
31.6 High Voltage Engineering
31.7 Project Management in Electrical Engineering
31.8 Energy Policy and Ethical Considerations
31.9 Sustainable Electrical Engineering Practices
Admission Ready - Completing your application - Atlantic International University
32.Topic
32.1Clean Energy Technology: Ecotechnology Applications
32.3.Introduction to Clean Energy and Ecotechnology
32.4.Solar Energy Technologies
32.5.Wind Energy Systems
32.6.Bioenergy and Biomass
32.7.Hydropower and Ocean Energy
32.8.Geothermal Energy
32.9.Energy Storage and Smart Grids
32.10.Policy and Economics of Clean Energy
32.11Ecological Impact of Renewable Energy
32.12.Future Directions in Clean Energy and Ecotechnology
2.1 Clean Energy Technology: Ecotechnology Applications
32.3 Introduction to Clean Energy and Ecotechnology
32.4 Solar Energy Technologies
32.5 Wind Energy Systems
32.6 Bioenergy and Biomass
32.7 Hydropower and Ocean Energy
32.8 Geothermal Energy
32.9 Energy Storage and Smart Grids
32.10 Policy and Economics of Clean Energy
32.11 Ecological Impact of Renewable Energy
32.12 Future Directions in Clean Energy and Ecotechnology
33.Topics
33.1Integration of Electronic Engineering in Construction and Civil Engineering
33.2.Introduction to Electronic Systems in Civil Engineering
33.3.Smart Construction Technologies
33.4.IoT in Infrastructure Management
33.5.Electronic Monitoring and Control Systems
33.6.Automation in Construction Machinery
33.7.Solar and Renewable Energy Systems in Civil Engineering
33.8.Building Information Modeling (BIM) and Electronic Systems
33.9.Cybersecurity in Smart Infrastructure
33.1 Integration of Electronic Engineering in Construction and Civil Engineering
33.2 Introduction to Electronic Systems in Civil Engineering
33.3 Smart Construction Technologies
33.4 IoT in Infrastructure Management
33.5 Electronic Monitoring and Control Systems
33.6 Automation in Construction Machinery
33.7 Solar and Renewable Energy Systems in Civil Engineering
33.8 Building Information Modeling (BIM) and Electronic Systems
33.9 Cybersecurity in Smart Infrastructure
34.1.Topic
34.2.Masters in Immutable Data Storage Solutions for Web Design
34.3.Introduction to Immutable Data
33.4.Immutable Data Structures
33.5.Immutable.js and Alternatives
33.6.State Management with Immutable Data
33.7.Performance Benefits of Immutable Data
33.8.GraphQL and Immutable Data
33.9.Immutable Data in Server-Side Rendering (SSR)
33.10.Security and Immutable Data
33.11.Future Trends in Immutable Data
Masters in Immutable Data Storage Solutions for Web Design
34.2 Introduction to Immutable Data
34.3 Immutable Data Structures
34.4
34.Topic
34.1.Masters in Immutable Data Storage Solutions for Web Design
34.2.Introduction to Immutable Data
34.3.Immutable Data Structures
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34.7.Immutable Data in Server-Side Rendering (SSR)
34.8.Security and Immutable Data
34.9.Future Trends in Immutable Data
34.1 Masters in Immutable Data Storage Solutions for Web Design
34.2 Introduction to Immutable Data
34.3 Immutable Data Structures

34.4
35.1.Topic
35.2.Advanced Cyber-Physical Systems in Telecommunications
35.3.Introduction to Cyber-Physical Systems
35.4.Network Architecture in CPS
35.5..IoT and Cyber-Physical Systems
35.6.Security and Privacy in CPS
35.7.Real-time Data Processing and Analytics
35.8.Machine Learning in Cyber-Physical Systems
35.9.Emerging Trends in CPS and Telecommunications
35.10.CPS Case Studies in Telecommunications
35.2 Advanced Cyber-Physical Systems in Telecommunications
35.3 Introduction to Cyber-Physical Systems
35.4 Network Architecture in CPS
35.5 IoT and Cyber-Physical Systems
35.6 Security and Privacy in CPS
35.7 Real-time Data Processing and Analytics
35.8 Machine Learning in Cyber-Physical Systems
35.9 Emerging Trends in CPS and Telecommunications
35.10 CPS Case Studies in Telecommunications

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36.1.Introduction to Artificial Intelligence and Machine Learning
36.2.Data Preprocessing and Feature Engineering
36.3.Supervised Learning Techniques
36.4.Unsupervised Learning and Clustering
36.5.Deep Learning and Neural Networks
36.6.Natural Language Processing
36.7.AI/ML in Software Development Lifecycle
36.8.Ethical and Responsible AI
36.8.Deployment and Scaling of AI Solutions
37.1 Master's Program in Artificial Intelligence and Machine Learning for Software Engineering
37.2 Introduction to Artificial Intelligence and Machine Learning
37.3 Data Preprocessing and Feature Engineering
37.4 Supervised Learning Techniques
37.5 Unsupervised Learning and Clustering
37.6 Deep Learning and Neural Networks
37.7 Natural Language Processing
37.8 AI/ML in Software Development Lifecycle
37.9 Ethical and Responsible AI
37.10 Deployment and Scaling of AI Solutions
37..Topics:
37.1.Advanced Studies in Autonomous Vehicles and Drones for Electric Vehicle Engineering
37.1.Introduction to Autonomous Systems
37.2.Electric Vehicle Engineering Basics
37.3.Sensor Technologies and Data Processing
37.4.Machine Learning and AI for Autonomous Systems
37.5.Communication Networks and IoT
37.6.Control Systems for Autonomous Vehicles
37.7.Ethical and Regulatory Aspects
37.8.Testing and Validation of Autonomous Systems
37.9.Integration of Renewable Energy in Autonomous Systems
37.1 Advanced Studies in Autonomous Vehicles and Drones for Electric Vehicle Engineering
37.2 Introduction to Autonomous Systems
37.3 Electric Vehicle Engineering Basics
37.4 Sensor Technologies and Data Processing
37.5 Machine Learning and AI for Autonomous Systems
37.6 Communication Networks and IoT
37.7 Control Systems for Autonomous Vehicles
37.8 Ethical and Regulatory Aspects
37.9 Testing and Validation of Autonomous Systems
37.10 Integration of Renewable Energy in Autonomous Systems
38.1.topics
38.2.Specialist Engineering in Infrastructure and Contractors: Electrochemical Engineering
38.3.Introduction to Electrochemical Engineering
38.4.Battery Technologies for Infrastructure
38.5.Fuel Cells and Their Applications
38.6.and Its Prevention
38.7..Electrochemical Sensors and Monitoring
38.8.Electrolysis and Industrial Processes
38.9.Sustainability and Electrochemical Engineering
.38.10.Advanced Topics in Electrochemical Engineering
38.2 Specialist Engineering in Infrastructure and Contractors: Electrochemical Engineering
38.3 Introduction to Electrochemical Engineering
38.4 Battery Technologies for Infrastructure
38.5 Fuel Cells and Their Applications
38.6 Corrosion and Its Prevention
38.7 Electrochemical Sensors and Monitoring
38.8 Electrolysis and Industrial Processes
38.9 Sustainability and Electrochemical Engineering
38.10 Advanced Topics in Electrochemical Engineering
40.1Topics:Energy Storage and Battery Technology
40.2.Introduction to Energy Storage Systems
40.3.Battery Chemistry and Physics
40.4.Design and Functionality of Battery Cells
40.5.Applications of Battery Storage
40.6.Efficiency and Performance Measurements
40.7.Safety and Environmental Impacts
40.8.Advanced Energy Storage Technologies
40.9.Policy and Economics of Energy Storage
40.10.Future Trends in Battery Technology
41.1.Topics:
41.2.Advanced Robotic Process Automation in Electrical Engineering
41.3.Introduction to Robotic Process Automation
41.4.RPA Tools and Technologies
41.5.Automating Electrical Design Processes
41.6.Data Migration and Management
41.7.RPA in Control Systems
41.8.Machine Learning and RPA

41.9.RPA and IoT in Electrical Systems
41.10.Security and Ethics in RPA
1.2 Advanced Robotic Process Automation in Electrical Engineering
41.3 Introduction to Robotic Process Automation
41.4 RPA Tools and Technologies
41.5 Automating Electrical Design Processes
41.6 Data Migration and Management
41.7 RPA in Control Systems
41.8 Machine Learning and RPA
41.9 RPA and IoT in Electrical Systems
41.10 Security and Ethics in RPA
44..1. Define the Problem
2. Develop the Mathematical Model
3. Simplify the Equations
4. Analytical Solution (if possible)
5. Numerical Solution (if necessary)
6. Simulation and Validation
7. Optimization (if applicable)
Example Calculation: Load Flow Analysis in Power Systems
1. Circuit Analysis
2. Electromagnetics
3. Signal Processing
4. Control Systems
5. Power Systems
6. Electronics
7. Digital Systems
8. Communication Systems
9. Renewable Energy Systems
1. Circuit Analysis
2. Electromagnetics
3. Signal Processing
4. Control Systems
5. Power Systems
6. Electronics
7. Digital Systems
8. Communication Systems
9. Renewable Energy Systems
. Circuit Design and Analysis
2. Power Systems Engineering
3. Control Systems
4. Communication Systems
5. Electronics and Semiconductor Design
6. Renewable Energy Systems
7. Building and Infrastructure
8. Biomedical Engineering
1. Signal Processing
2. Communication Systems
3. Information Theory
4. Network Theory
6. Digital Communication
1. Signal Processing
2. Communication Systems
3. Information Theory
4. Network Theory
5. Electromagnetic Theory
6. Digital Communication
Practical Examples:
IoT (Internet of Things)
Solar Power Systems
Wind Energy Projects
Communication Systems Calculations
1. MIMO (Multiple Input Multiple Output) Systems
2. Satellite Communication
3. Optical Fiber Communication
4. IoT (Internet of Things)
Ancient Times
System Design and Operation
Battery Technologies for Infrastructure
34.6 Performance Benefits of Immutable Data
38.7 Electrochemical Sensors and Monitoring
38.8 Electrolysis and Industrial Processes
38.9 Sustainability and Electrochemical Engineering
5. Automating Electrical Design Processes
Integral and Derivative Calculations in Automating Electrical Design Processes
Project Management in Electrical Engineering
Integral and Derivative Calculations in Project Management
Wind Energy, Solar Energy, and Hydroelectric Power
Electrical Infrastructure Design and Management
Smart Grids and IoT Applications
Understanding the Basic Concepts of Social Media Marketing
Television and Radio Production Essentials
Roberto Aldrett - ALU
Career Coach
Life-Coach Consulting
Master in Modern Power and Energy Systems
Master in Renewable Energy
Bibliographic Resources
The Future Of Science and Engineering
The Constantly Changing Education Landscape
Academic Freedom to Discover Your Purpose Open Curriculum Design at Atlantic International University
Core Courses and Topics in Engineering Systems:
Orientation Courses:
Research Project in Engineering Systems:
Academic Freedom to Discover Your Purpose Open Curriculum Design at Atlantic International University
Core Courses and Topics in Engineering Systems:
Orientation Courses:
Research Project in Engineering Systems:
Academic Freedom to Discover Your Purpose Open Curriculum Design at Atlantic International University
Core Courses and Topics in Engineering Systems:

Orientation Courses:
Research Project in Engineering Systems:
Courses and Topics in Doctorate in Electrical Engineering
Orientation Course
Research Projects in Doctorate in Electrical Engineering
Thesis. Degree honor, council quality rules low become justice development court and labor relations conciliation mediation, Engineering electrical trade research policy skill ,safety security order develop ,defense order
Contact Information and Admission call – Atlantic International University
Course Ciriculum Total Course Thesis Alumine(1)
Reviews (1)
Re: FW: Article submission received #TrackingId:21365851
Your article submission 161981
editorial@f1000research.com

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- section 2
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ction 3
- section 3
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PAGE TOPICS	MODULE	ID	PROJECT NAME		OWNER	DAYS	START	END	SIMPLE PRODUCTION SCHEDULE	DRAFT 1	TECHNICAL RE
4			MARKETING R SCOPE DEFITION						WORKING BUDGET		
4											
68			DEFINTION RESEARCH OBJECTIVE								
68									CHAPITER 1		
247			DEFINIE RESEARCH REQUIRENT						CHAPITER 2		
444			DETERMINE						CHAPITER 1		
	565		VENDOREBSELECTION CITERIA						CHAPITER 1		
	565		DEVELOPMENT QUESTION						CHAPITER 1	C	
565			DEVELOPMENT QUESTION						CHAPITER 1		
565			DEVELOPMENT QUESTION						CHAPITER 1		
565			STATEMENT						CHAPITER 1		
566			EVALUATION PROPOSAL						CHAPITER 1		
566			SELECTOR VENDORE						CHAPITER 1		
566			RESEARCH						CHAPITER 1		
	566								CHAPITER 1		
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1. Circulum design format offline.
-Name : tshingombe Tshitadi

-4.1 .1
course title| course objectives | |
course description | | activity to
-

course title	course objectives	course description	activity to carry out	ID source of
Advanced Electromagnetic Theory	▯ Advanced Electromagnetic Theory: This delves into Maxwell's equations, electromagnetic waves, and their applications in various fields such as antenna design, microwave engineering, and more.	Course Descriptions	Advanced Electromagnetic Theory	Sources for Advanced Electrical Engineering Courses
Digital Signal Processing				
Control Systems Design	▯ ▯ Digital Signal Processing (DSP): This involves the analysis and manipulation of signals. It's crucial in areas such as communications, audio and speech processing, radar, and image processing.	Advanced Electromagnetic Theory: This course delves into the intricacies of Maxwell's equations and their applications. Topics include electromagnetic wave propagation, radiation, and scattering. Students will learn to design and analyze antennas, microwave circuits, and other electromagnetic devices.	Objectives:	1.
Advanced Communication Systems				Advanced Electromagnetic Theory
Power Systems Engineering	▯ ▯ Control Systems Design: This focuses on designing systems that can control the behavior of other systems. Applications include robotics, aerospace, automotive systems, and industrial automation.	Digital Signal Processing (DSP): This course focuses on the principles and applications of discrete-time signal processing. Topics covered include sampling, digital filter design, Fourier transforms, and signal analysis. Students will gain hands-on experience with MATLAB/Python for implementing DSP algorithms.	•	
Renewable Energy Systems			Understand Maxwell's equations and their applications.	2.
VLSI (Very Large Scale Integration) Design	▯ ▯ Advanced Communication Systems: This covers the principles and technologies behind modern communication systems, including wireless communications, fiber optics, and satellite communications.	Control Systems Design: This course covers the design and analysis of feedback control systems. Students will learn about root locus, frequency response, and state-space methods for controller design. Applications include robotics, aerospace, and automotive systems.		1.
Machine Learning in Electrical Engineering			•	Books: "Classical Electrodynamics" by John David Jackson, "Principles of Electrodynamics" by Melvin Schwartz
	▯ ▯ Power Systems Engineering: This involves the generation, transmission, and distribution of electrical power. It covers topics such as power system stability, smart grids, and renewable energy integration.	Advanced Communication Systems: This course explores the principles of modern communication systems. Topics include modulation and demodulation, noise analysis, and the design of wireless and optical communication systems. Students will also study the latest advancements in communication technologies.	•	
			Analyze electromagnetic wave propagation in different media.	2.
	▯ ▯ Renewable Energy Systems: This explores the technologies and systems used to generate energy from renewable sources like solar, wind, and hydroelectric power. It's increasingly important for sustainable development.	Power Systems Engineering: This course covers the generation, transmission, and distribution of electrical power. Topics include power system stability, protection, and smart grids. Students will also learn about the integration of renewable energy sources into power grids.		3.
			•	Online Courses: MIT OpenCourseWare, Coursera

	▯ ▯ VLSI (Very Large Scale Integration) Design: This involves designing and creating integrated circuits with millions of transistors on a single chip. It's essential for the development of modern electronic devices.	Renewable Energy Systems: This course examines the technologies and systems used to generate energy from renewable sources such as solar, wind, and hydroelectric power. Topics include energy conversion, efficiency analysis, and the design of renewable energy systems.	•	
			Design and analyze antennas and microwave circuits.	4.
	▯ ▯ Machine Learning in Electrical Engineering: This examines the application of machine learning techniques to solve problems in electrical engineering, such as predictive maintenance, signal processing, and system optimization	VLSI (Very Large Scale Integration) Design: This course focuses on the principles of designing integrated circuits with millions of transistors. Topics include digital and analog circuit design, fabrication processes, and the use of VLSI design tools. Students will gain practical experience in designing and simulating VLSI circuits.		3.
			•	Digital Signal Processing (DSP)
	▯ ▯ Advanced Electromagnetic Theory: This delves into Maxwell's equations, electromagnetic waves, and their applications in various fields such as antenna design, microwave engineering, and more.	Machine Learning in Electrical Engineering: This course introduces the application of machine learning techniques to solve electrical engineering problems. Topics include supervised and unsupervised learning, neural networks, and deep learning. Students will apply machine learning to areas such as predictive maintenance, signal processing, and system optimization.	Activities:	
				4.
	▯ ▯ Digital Signal Processing (DSP): This involves the analysis and manipulation of signals. It's crucial in areas such as communications, audio and speech processing, radar, and image processing.	These descriptions should give a comprehensive overview of each course. If you need more detailed information on any specific topic or have any other questions, feel free to ask!	•	1.

10.INPUT X1

20. INPUT .X2

30. INPUT X3

40. INPUT X4

50,IN[UT X5

60. INPUT X6

60.INPUT .X7.

70.OUTPUT S1

80.OUTPUT.S2

90,OUTPUT S3

100.OUTPUT S4

110.OUTPUT S5

120 OUTPUT S6

130.OUTPUT S7

140.OUTPUT

150 SELECT REGISTER

150 OUTPUT HARDWARD

160 STRUCTURE PROGRAMME.

170.{ " IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=)THEN "} OR "SUB"_" CLICK"

"SELECT REGISTER .ELSE , CPU"=0 , ADRESSPIN = 000000000

180 END IF " IF (S1=0)+(S2=0)+(S3=0)+(S4=0)+(S5=0)+(S6=0)+(S7=0)+(S8=0)THEN "} OR "SUB"_" CLICK

EXECUTION LOOP

170.{ " IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=0)THEN "} OR "SUB"_" CLICK"

SELECT REGISTER .ELSE , CPU ,

180 END IF " IF (S1=1)+(S2=1)+(S3=1)+(S4=1)+(S5=1)+(S6=1)+(S7=1)+(S8=1)THEN "} OR "SUB"_" CLICK

EXECUTION LOOP

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STATEMENT  LINE (  )

CREATE MODULE HELLO CLASS

END SUB

END MODULE





' Macro1 Macro

' visual basic atm program .sten object by system .event )hand

' "&chr(10)&"public class transaction box

' "&chr(10)&"const service as decimal =6.5

' "&chr(10)&"const pin as integer +9343

' "&chr(10)&"dim balance as decimal =150

' "&chr(10)&"private sub label 12_click (by sender System.object event arg handles labe

'

End Sub

Sub Macro2()

'

' Macro2 Macro

' type meter three phase ac static watt hous smart

' "&chr(10)&"metering algorith

' "&chr(10)&"accuracy  nomial voltage  mettering frequence metering const functionality current
sensors energy pulse energy temper detection remote communication iec 62056 extrevm internal
battery

'

   ActiveWindow.ActivePane.VerticalPercentScrolled = 205

   ActiveWindow.ActivePane.VerticalPercentScrolled = 146

   Selection.TypeText Text:= _
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    "-----------------------------------------------------------"
Selection.TypeText Text:= _
    "-----------------------------------------------------------"
Selection.TypeText Text:="-------"
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Selection.PasteAndFormat (wdFormatOriginalFormatting)
ActiveWindow.ActivePane.VerticalPercentScrolled = 146
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    Selection.TypeParagraph
    Selection.TypeParagraph
    Selection.TypeParagraph
    Selection.Paste
    ActiveDocument.Save
    ActiveWindow.ActivePane.VerticalPercentScrolled = 207
    ActiveWindow.ActivePane.VerticalPercentScrolled = 202
    ActiveWindow.ActivePane.VerticalPercentScrolled = 197
    ActiveWindow.ActivePane.LargeScroll Down:=1
    ActiveWindow.ActivePane.VerticalPercentScrolled = -75
    ActiveWindow.ActivePane.VerticalPercentScrolled = -41
    Windows("Doc8 drawing tshingombe fiston").Activate
    Windows("Doc2 drawing tshingombe").Activate
    ActiveWindow.ActivePane.VerticalPercentScrolled = 127
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ChangeFileOpenDirectory "C:\Users\Library SIX\Desktop\"
    ActiveDocument.SaveAs2 FileName:="Doc1 tshing.docx", FileFormat:= _
        wdFormatXMLDocument, LockComments:=False, Password:="", AddToRecentFiles _
        :=True, WritePassword:="", ReadOnlyRecommended:=False, EmbedTrueTypeFonts _
        :=False, SaveNativePictureFormat:=False, SaveFormsData:=False, _
        SaveAsAOCELetter:=False, CompatibilityMode:=15
    ActiveWindow.Close
    Application.Quit
End Sub
Sub Macro3()
```

```
'

' Macro3 Macro

' 170.{ “ IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=)THEN ”}  OR “SUB”_” CLICK”

' "&chr(10)&" “SELECT REGISTER .ELSE , CPU”=0 ,  ADRESSPIN = 000000000

' "&chr(10)&"180 END IF “ IF (S1=0)+(S2=0)+(S3=0)+(S4=0)+(S5=0)+(S6=0)+(S7=0)+(S8=0)THEN ”}  OR
“SUB”_” CLICK

' "&chr(10)&"EXECU

'

   Application.Run MacroName:="frm1"

End Sub

Sub Macro4()

'

' Macro4 Macro

' 170.{ “ IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=0)THEN ”}  OR “SUB”_” CLICK”

' "&chr(10)&" SELECT REGISTER .ELSE , CPU ,

' "&chr(10)&"180 END IF “ IF (S1=1)+(S2=1)+(S3=1)+(S4=1)+(S5=1)+(S6=1)+(S7=1)+(S8=1)THEN ”}  OR
“SUB”_” CLICK

' "&chr(10)&"EXECUTION LOOP

'



'

   Application.Run MacroName:="frm1"

   ActiveWindow.ActivePane.VerticalPercentScrolled = 119

   Selection.Copy

   Application.Run MacroName:="frm1"

End Sub

Sub Macro5()

'

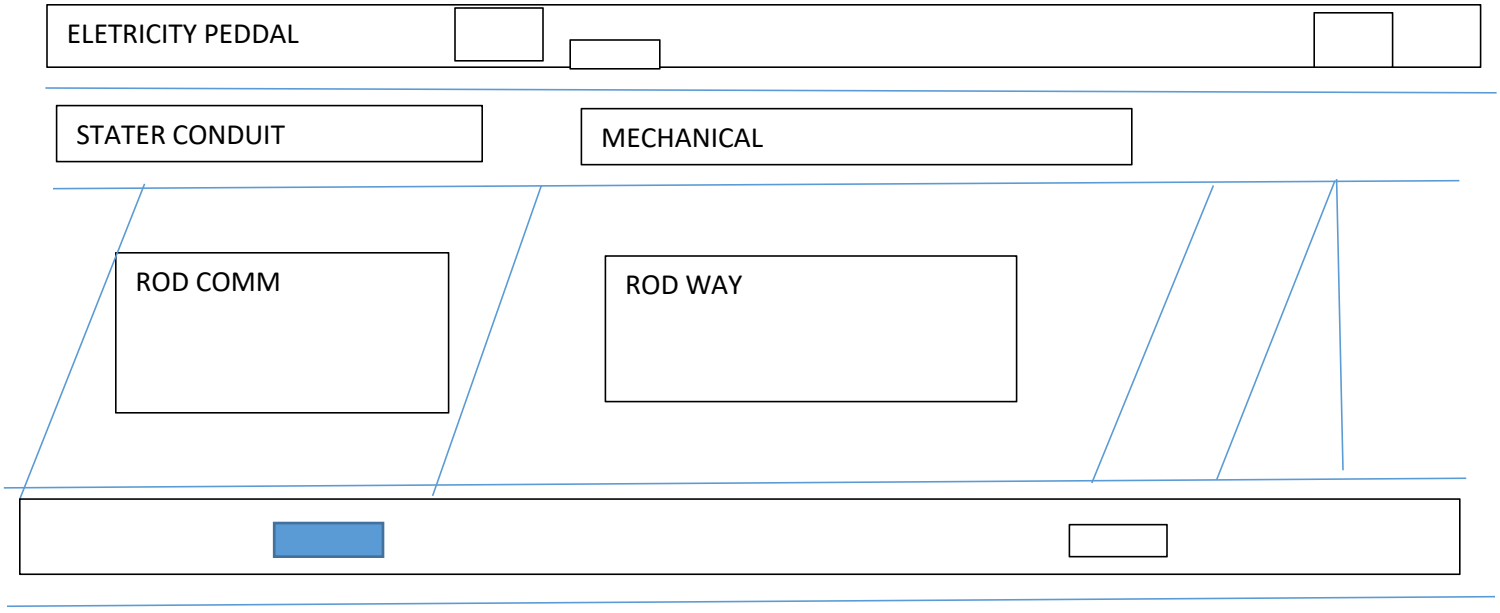
' Macro5 Macro
```

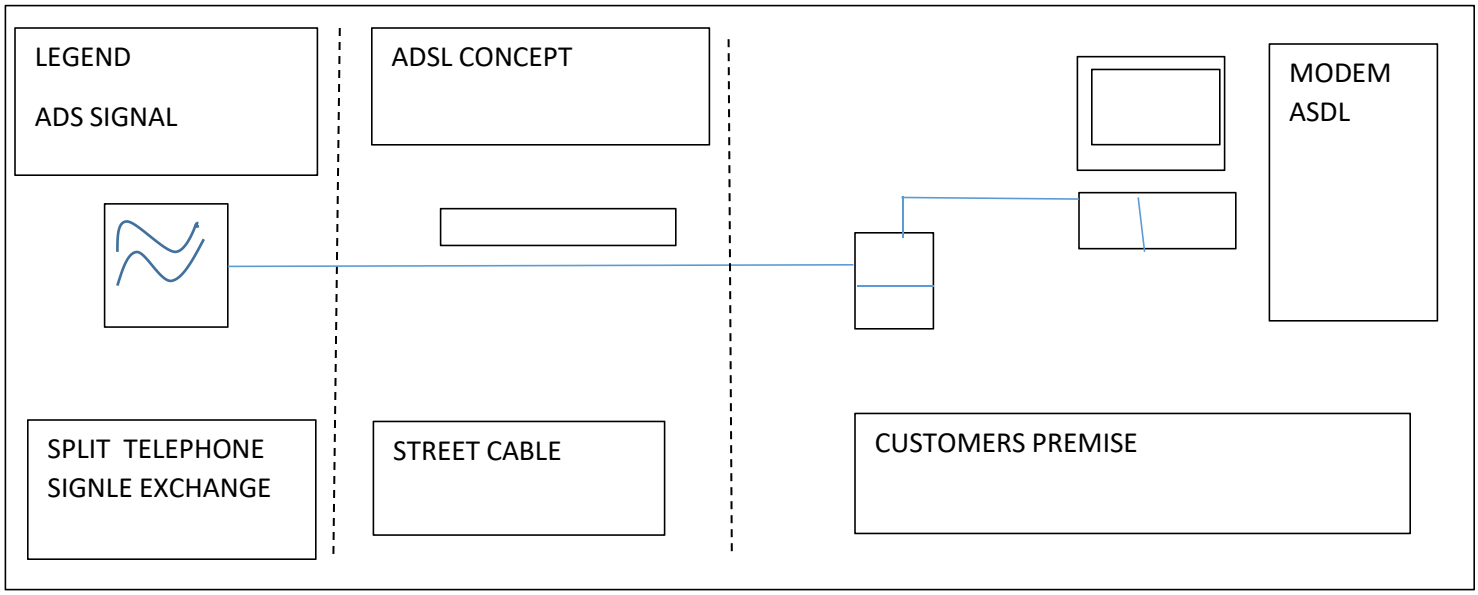
```
' 10.INPUT X1
' "&chr(10)&"20. INPUT .X2
' "&chr(10)&"30. INPUT X3
' "&chr(10)&"40. INPUT X4
' "&chr(10)&"50,IN[UT X5
' "&chr(10)&"60. INPUT X6
' "&chr(10)&"60.INPUT .X7.
'

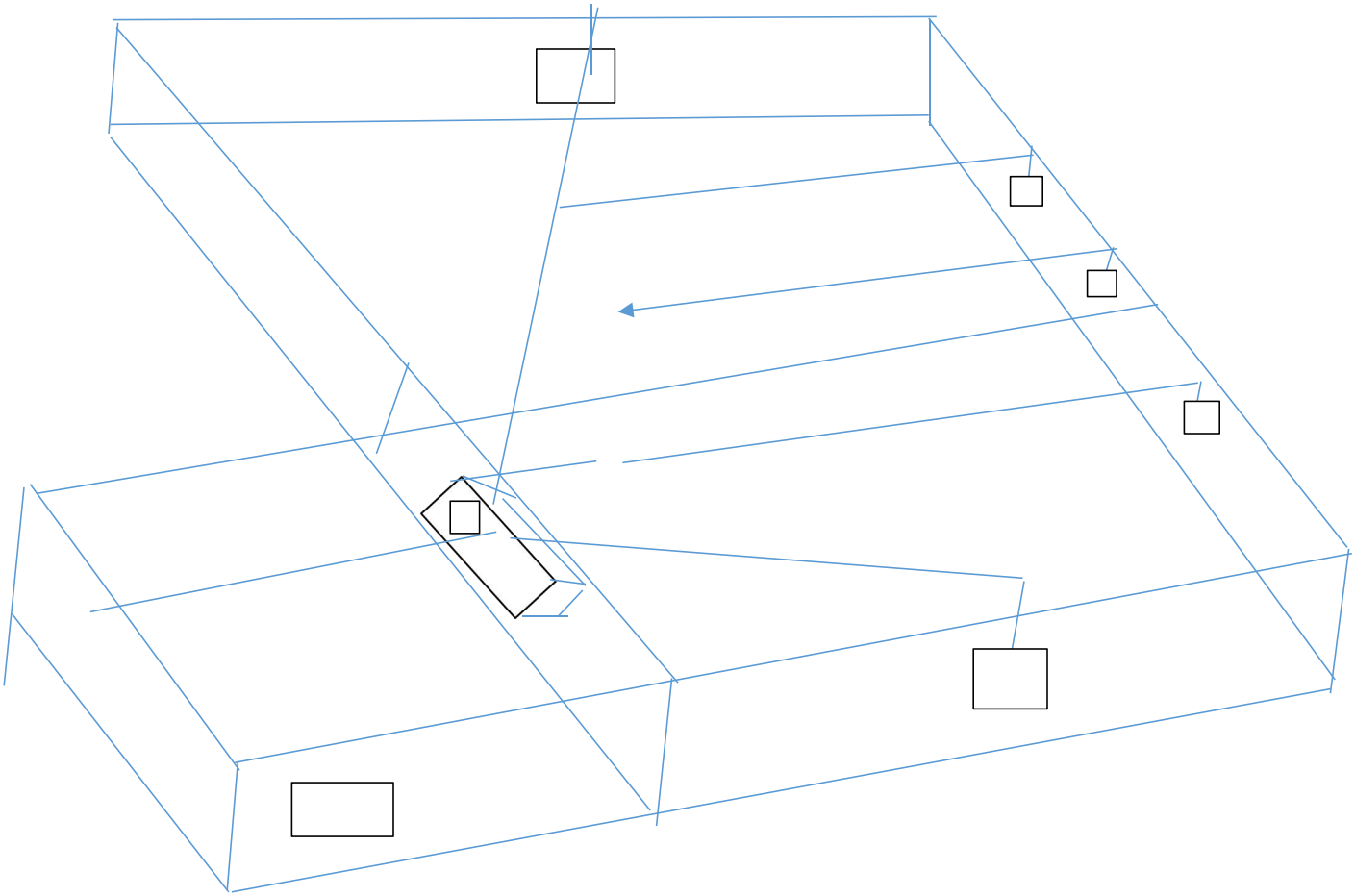
' "&chr(10)&" 70.OUTPUT  S1
' "&chr(10)&"80.OUTPUT.S2
' "&chr(10)&"90,OUTPUT S3
' "&chr(10)&"100.OUTPUT S4
' "&chr(10)&"110.OUTPUT S5
' "&chr(10)&"120 OUTPUT S6
' "&chr(10)&"130.OUTPUT S7
' "&chr(10)&"140.OUTPUT
' "&chr(10)&"150 SELECT REGISTER
' "&chr(10)&"150 OUTPUT HARDW
'
   Application.Run MacroName:="frm1"
End Sub
Sub frm1()
'
' frm1 Macro
'
'


End Sub
```

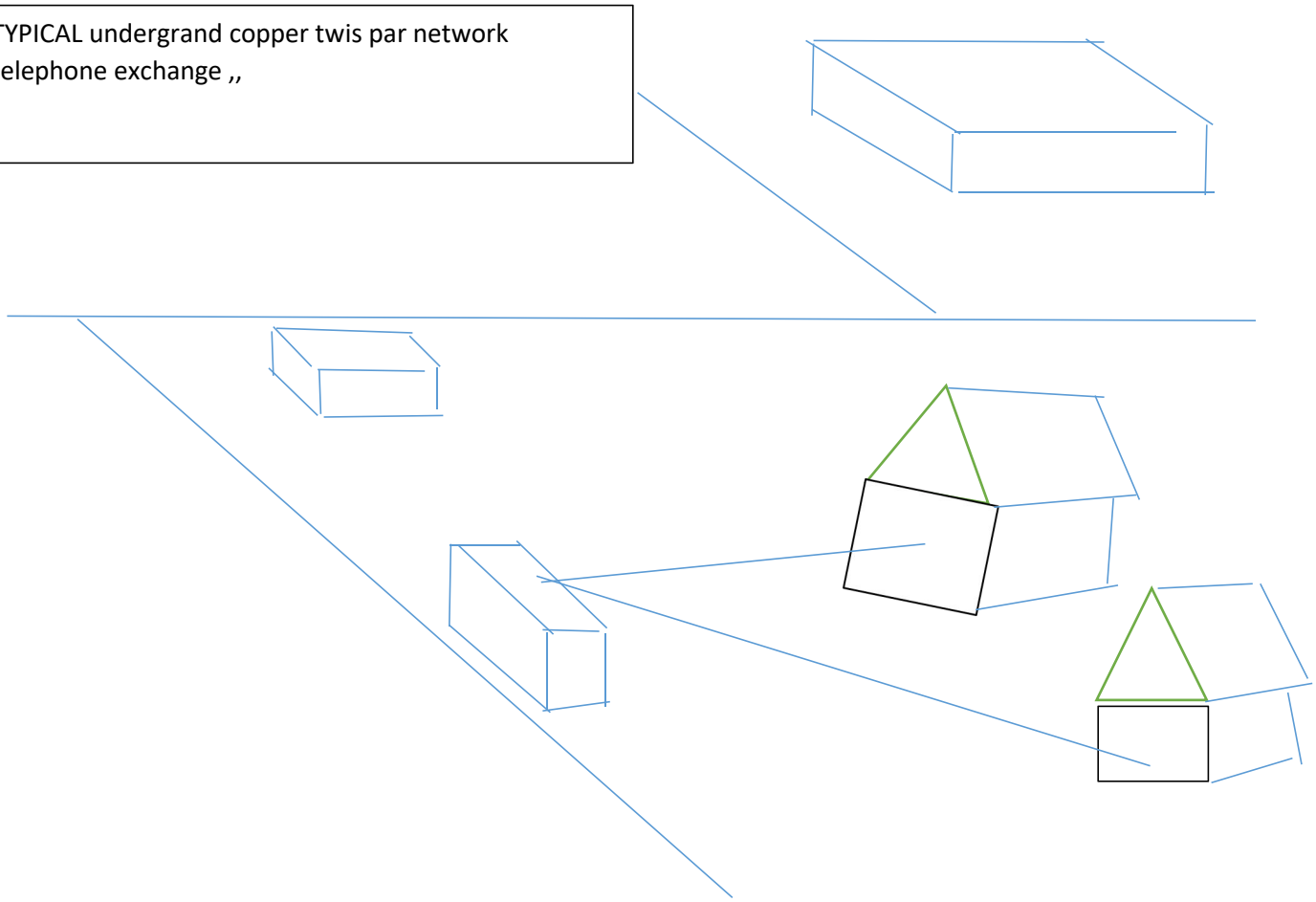
TYPICAL TELECOMMUNICATION STREET DISTRIBUTION FOR NEW URBAN RESIDENTION ESTATE USING SINGLE SIDE WITH ON BOTH ,,LOT710 LOT 711 L07



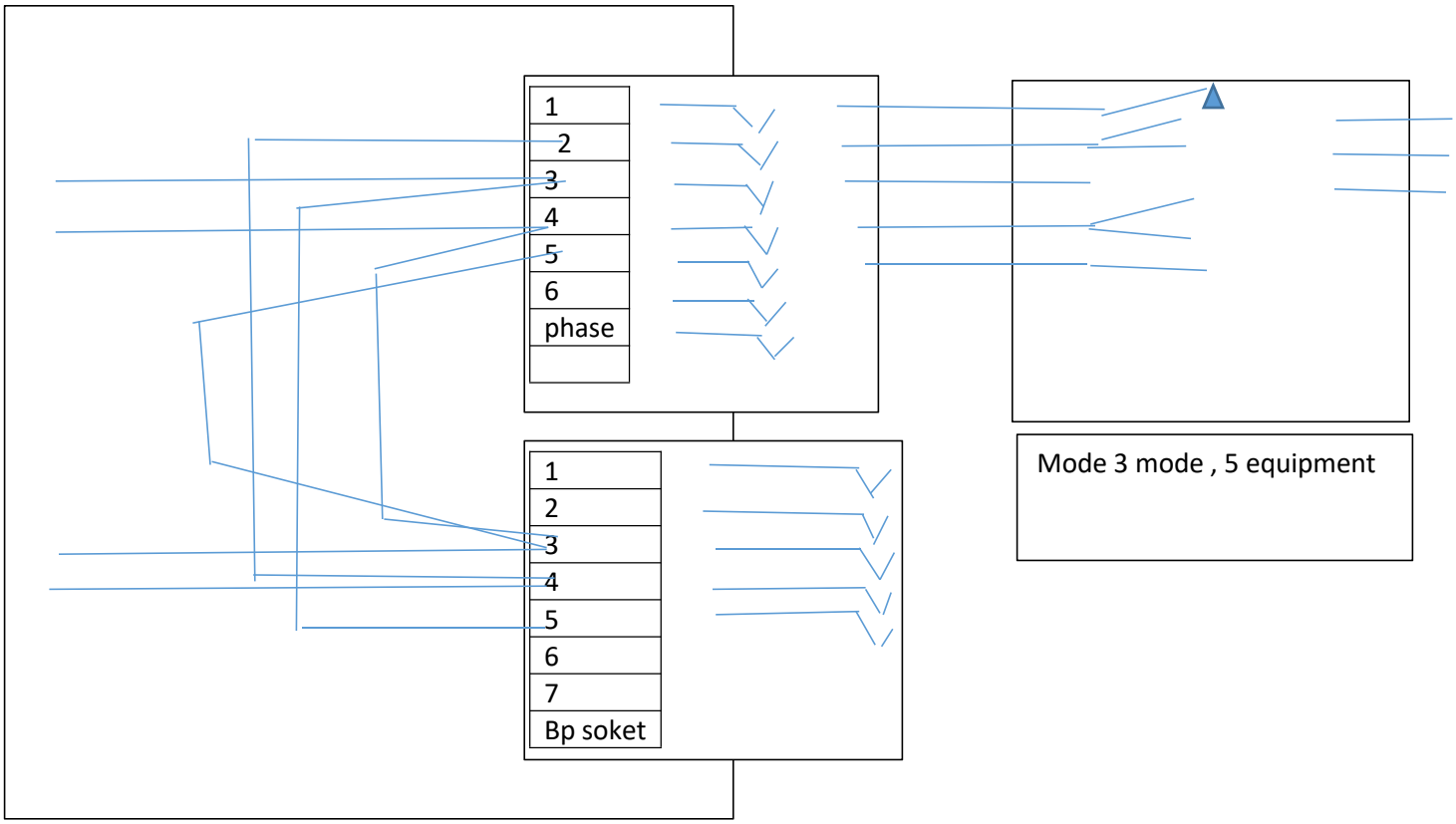




TYPICAL undergrand copper twis par network telephone exchange ,,



Cabling of homes for telecommunication , a completed guide to home cabling



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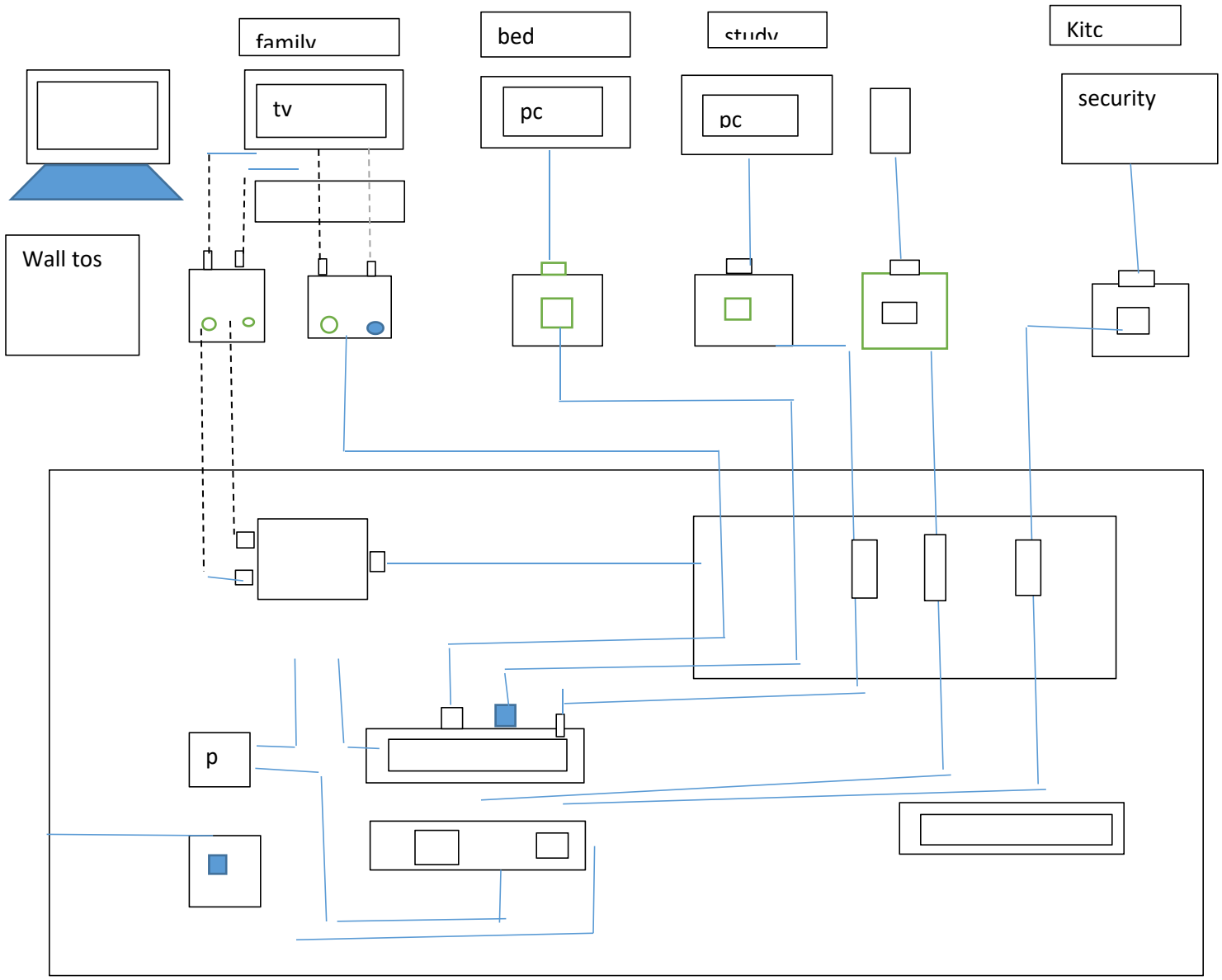


Legend :

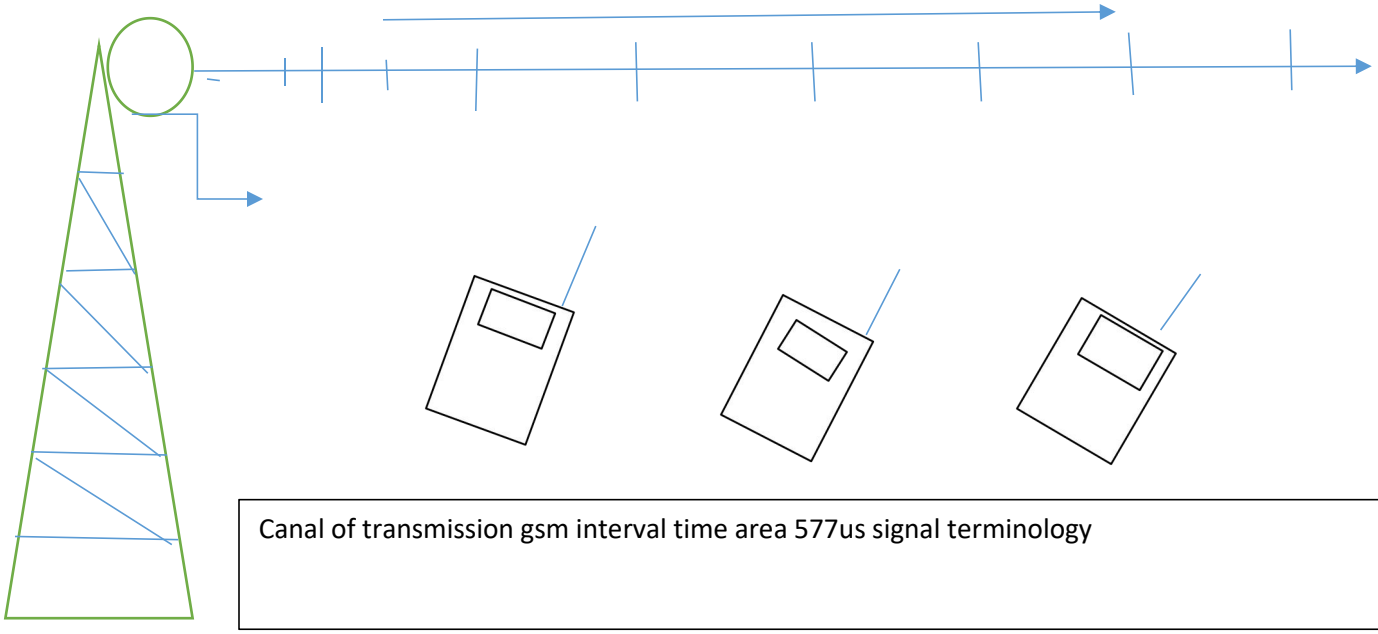
Modulator socket CCP

Modulator FTT

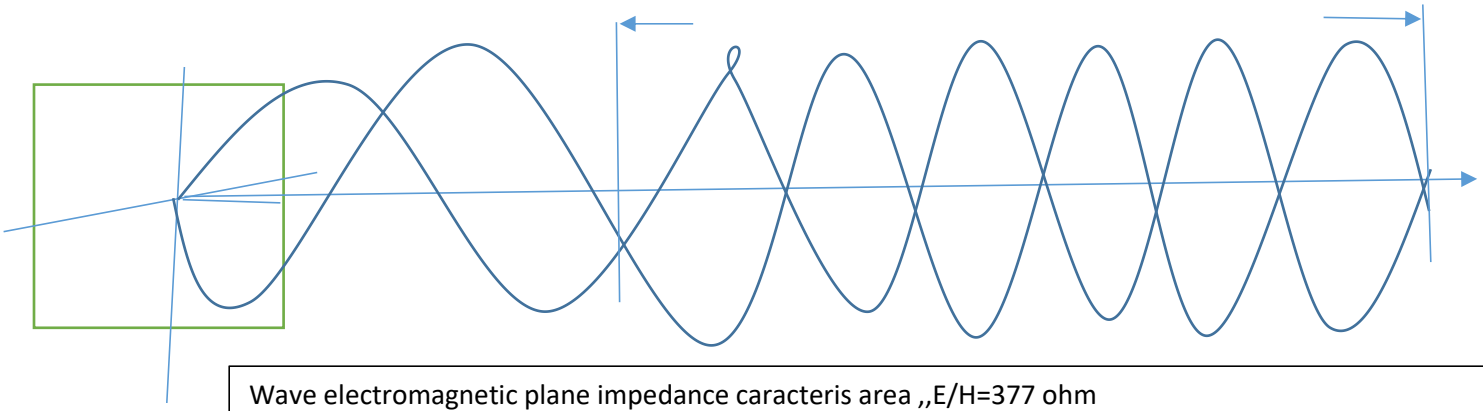
Coaxial sock NTD

Coaxial plui PC

OPTIC



Canal of transmission gsm interval time area 577us signal terminology



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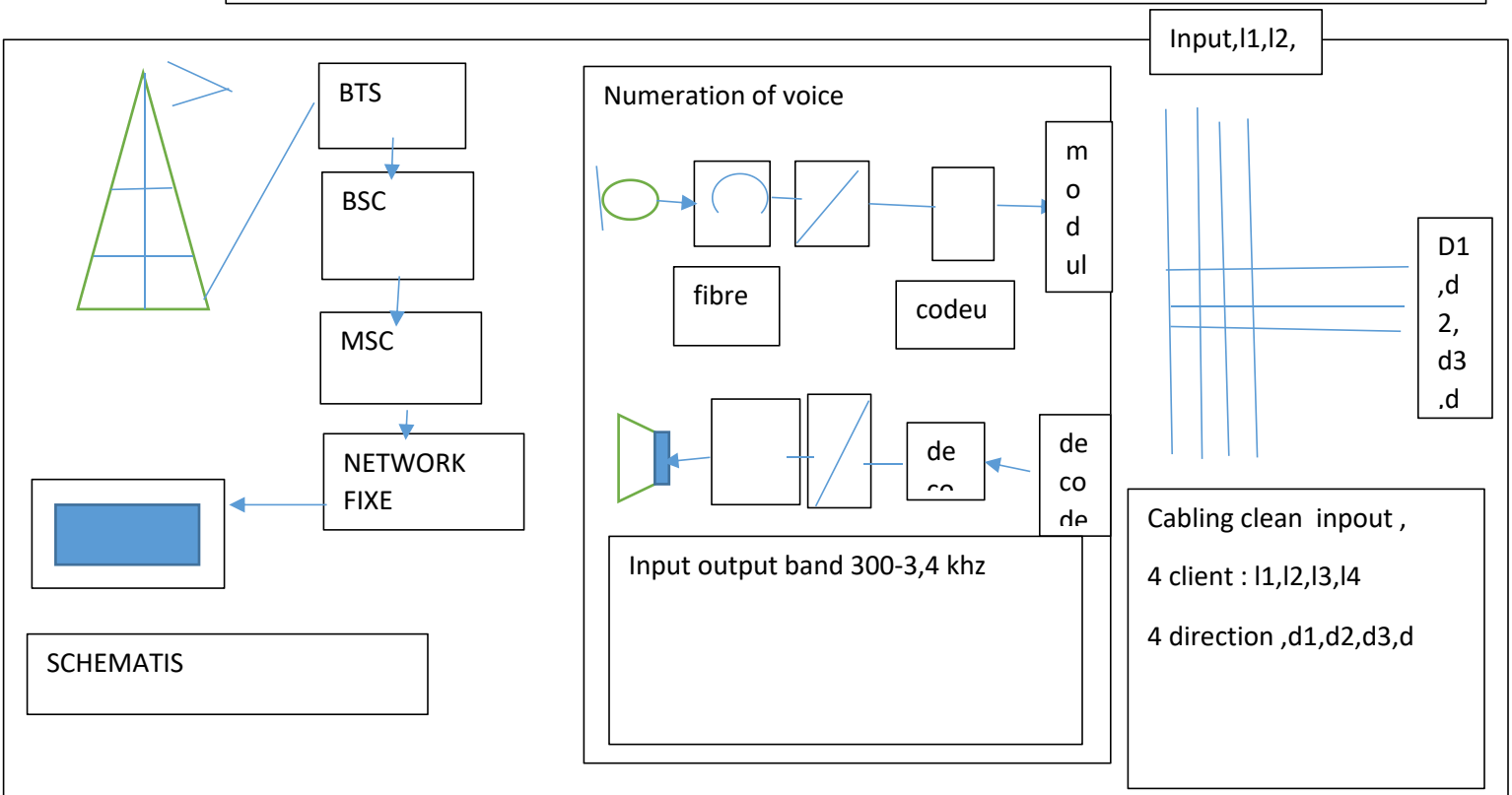

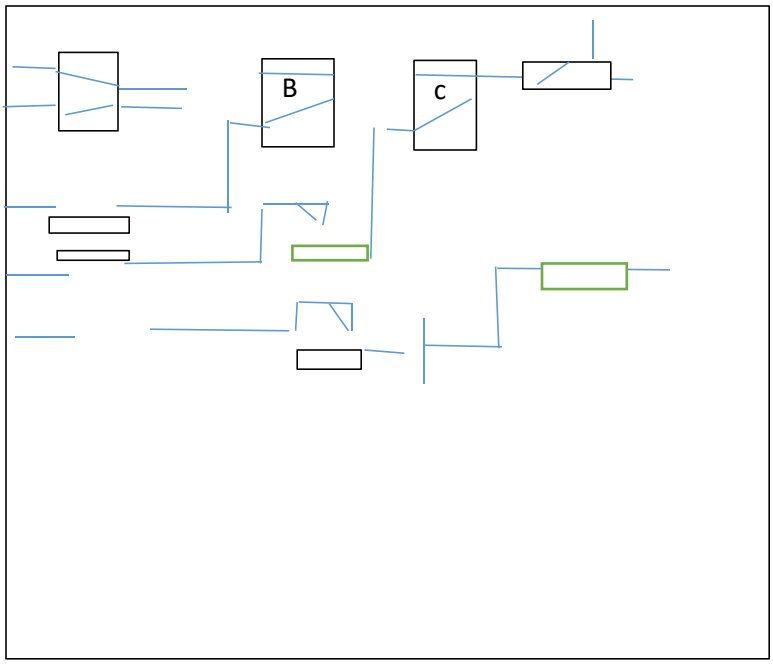

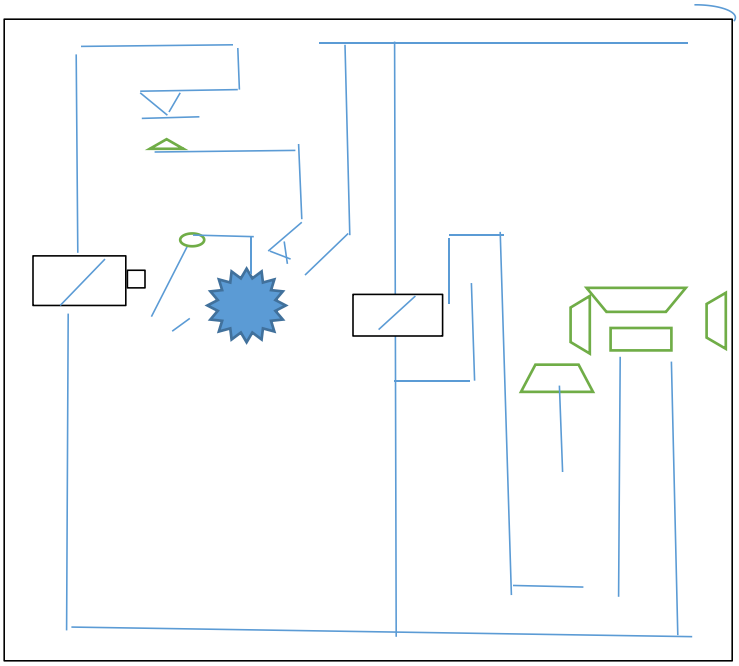

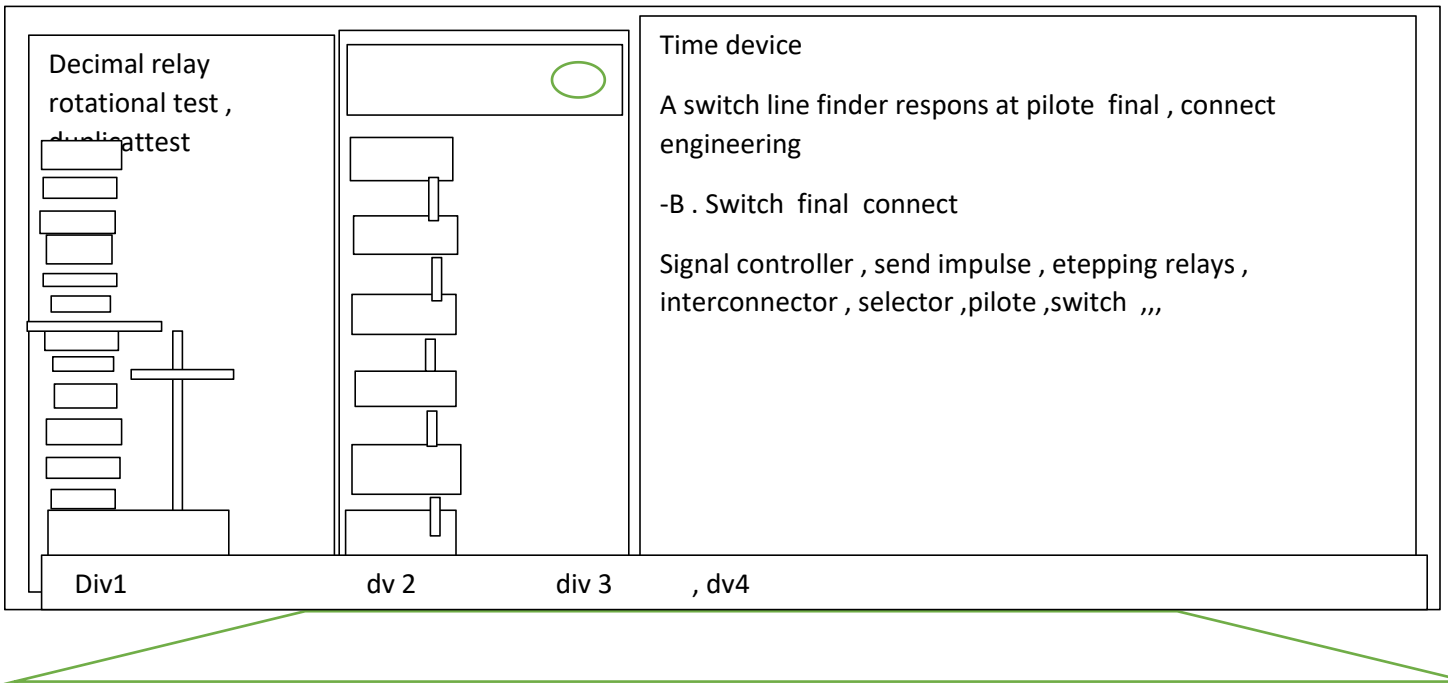

Time device

A switch line finder respons at pilote final , connect engineering

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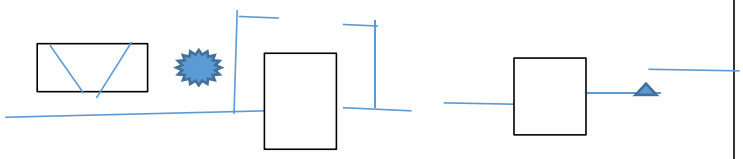

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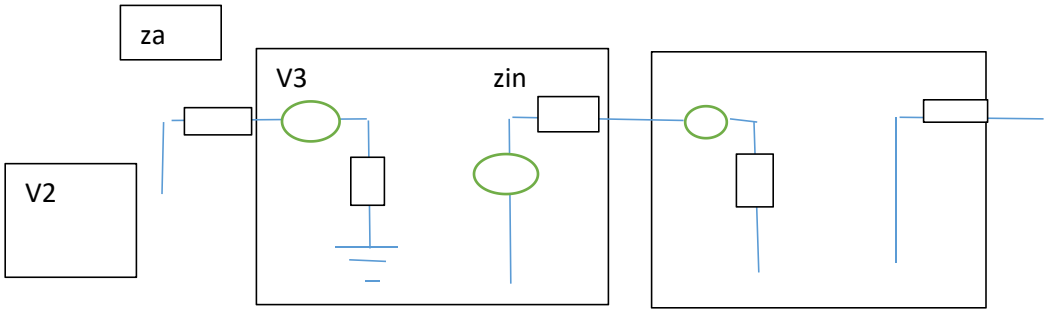

B= Zin /zin 1+z2, sq 2

Consummation aun of network unity , captor , can unity stockage , emitor

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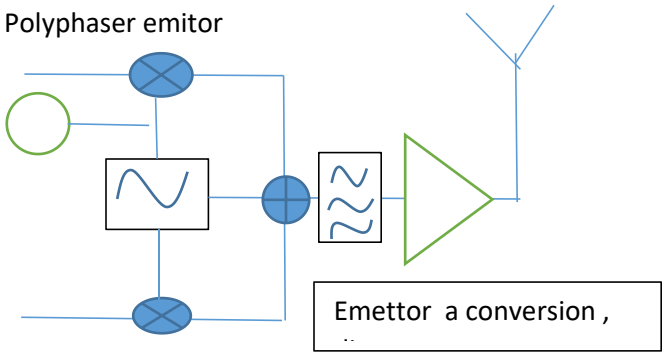

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A.cos(w

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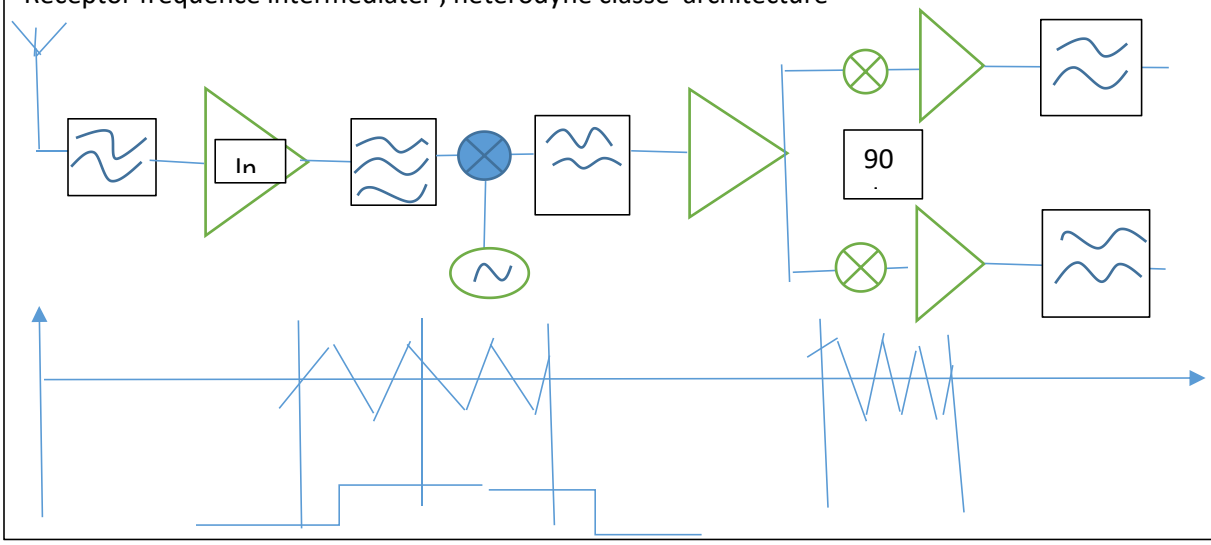

Telemetr

Video output pentode

Power pentode

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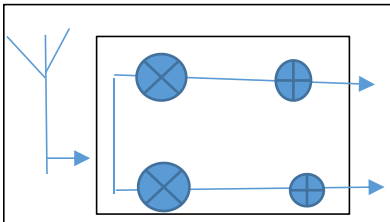

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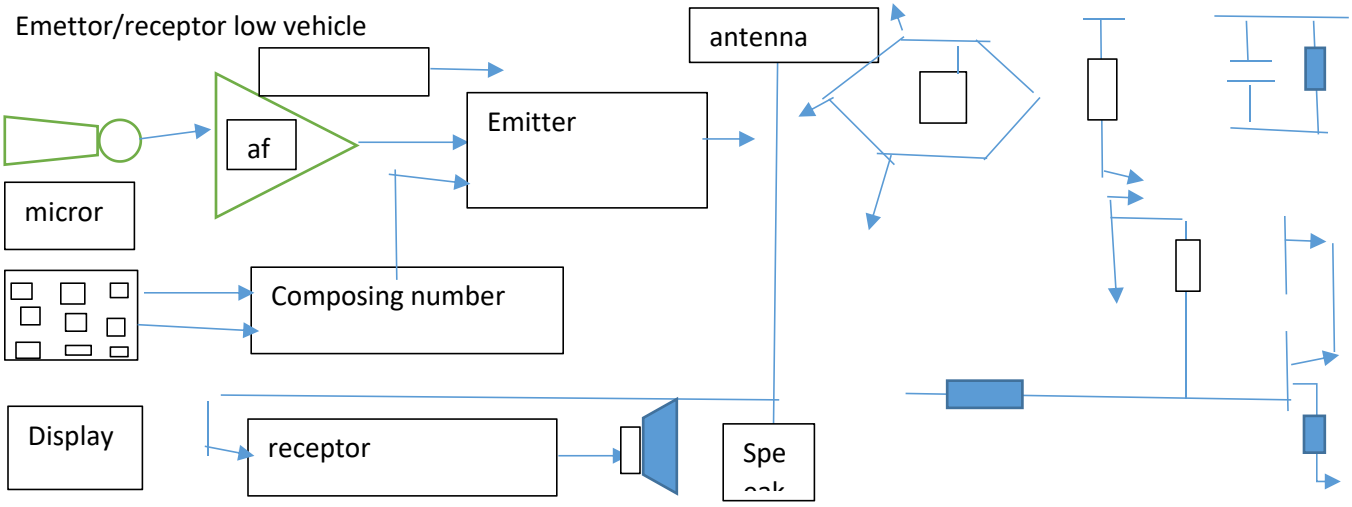
Emettor/receptor low vehicle



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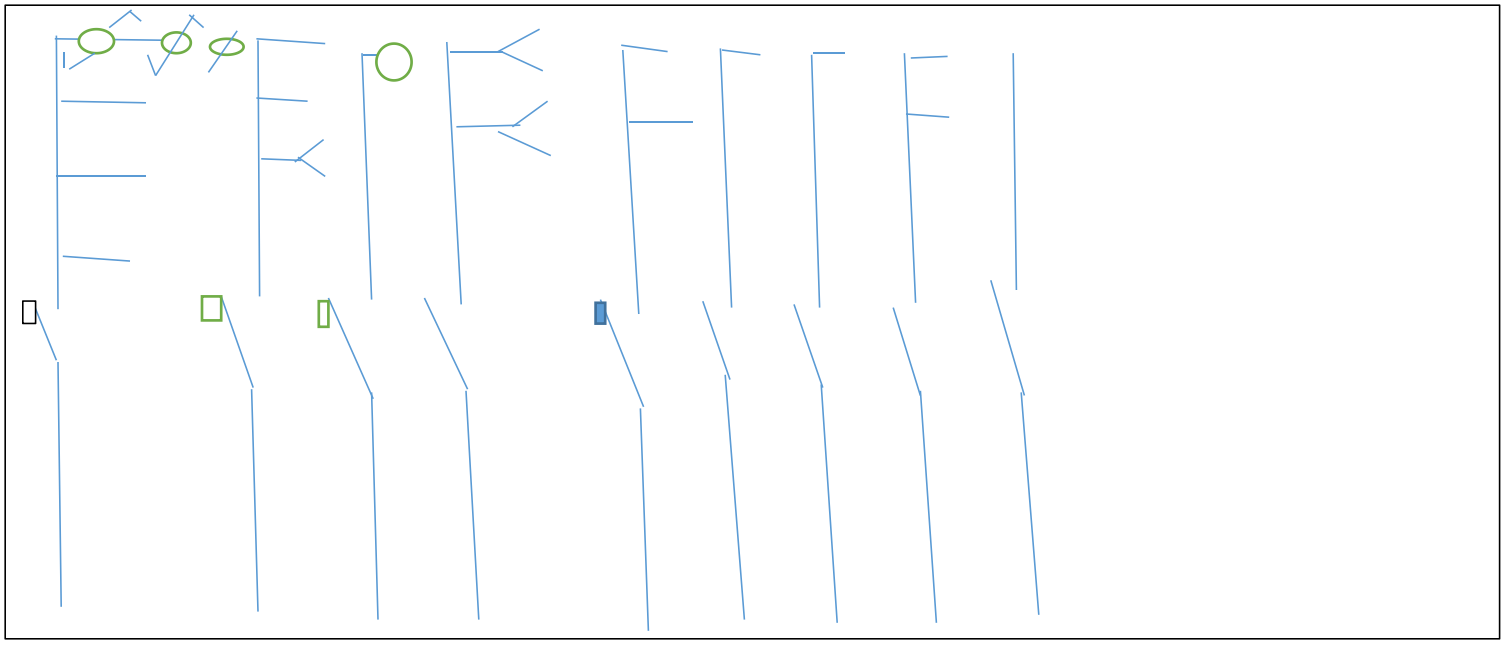

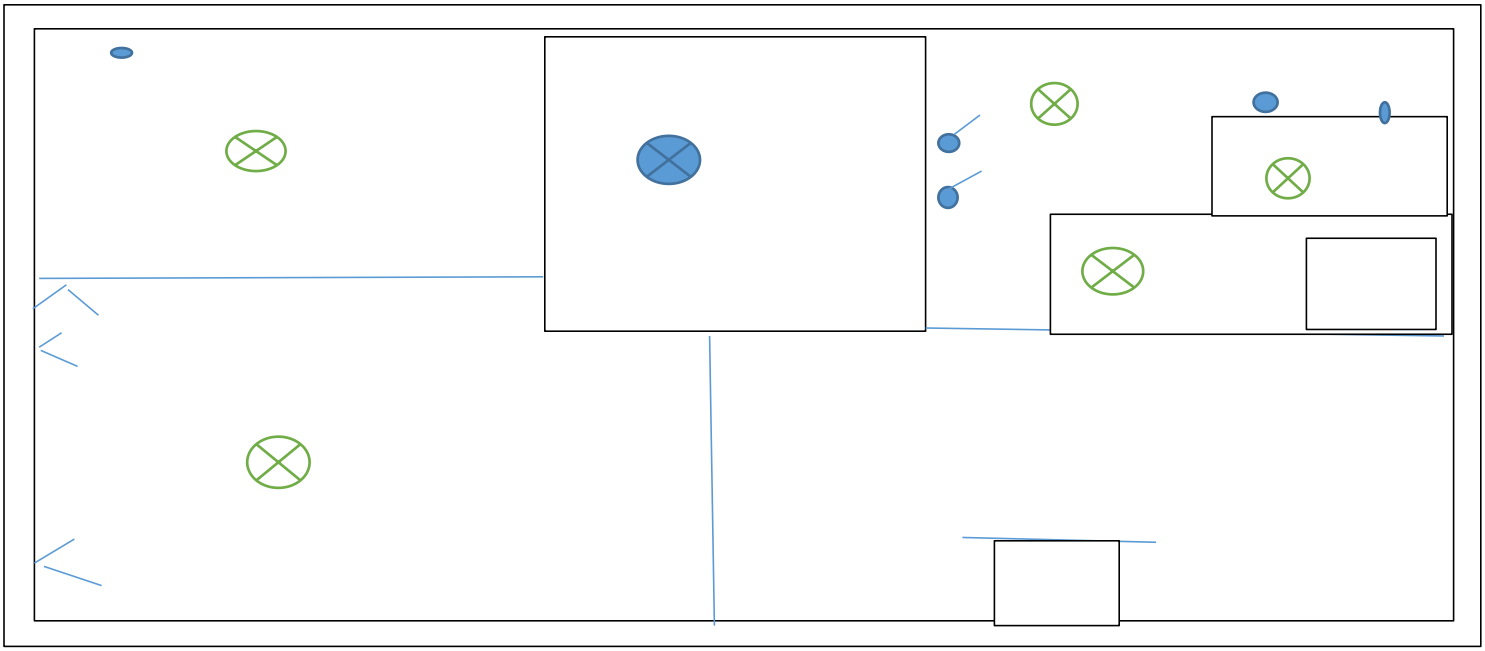

Completed plan of position

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-radio-technical

Power amplificatory tv sound basic oscillator line petode tube Characteristic		
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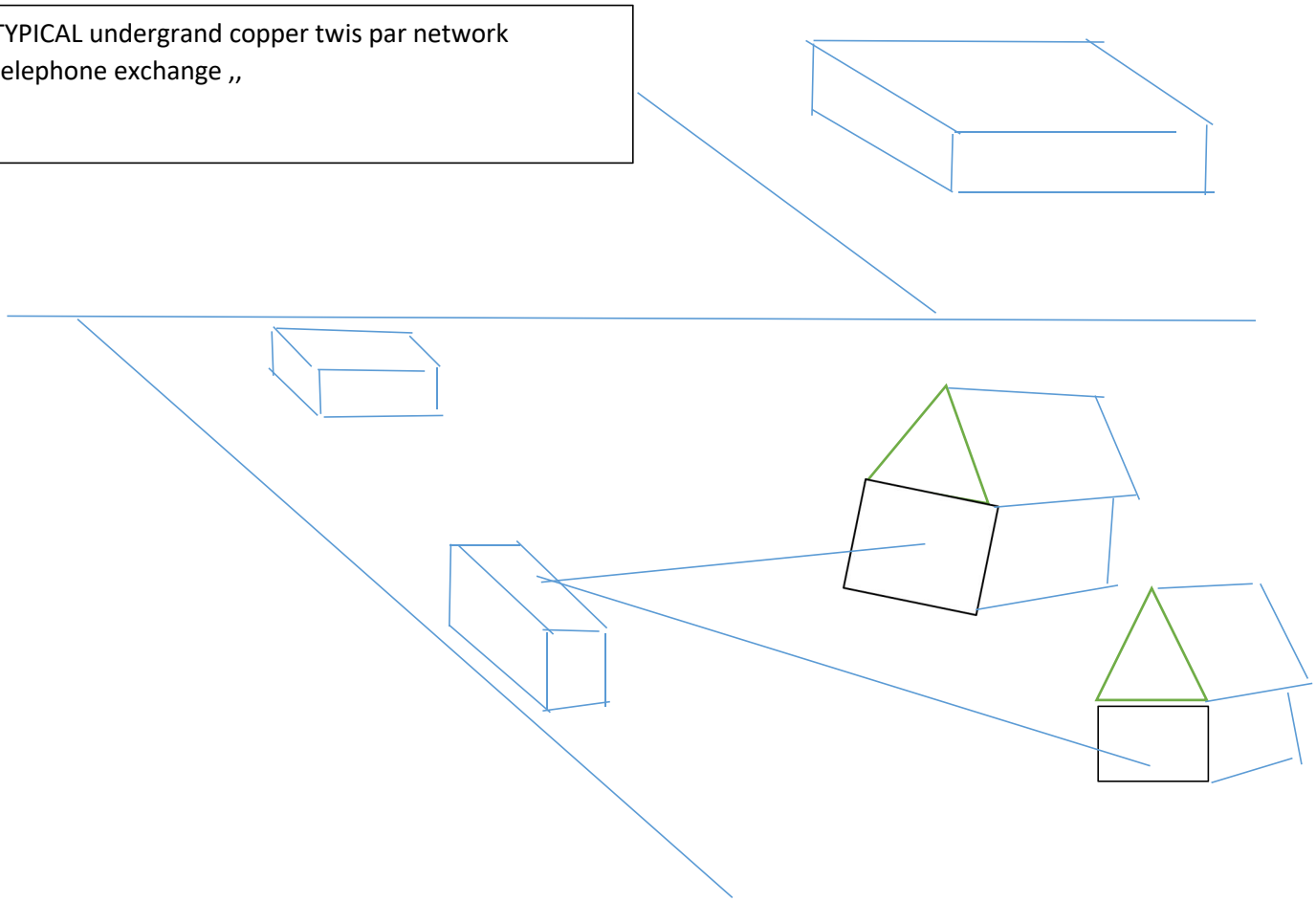

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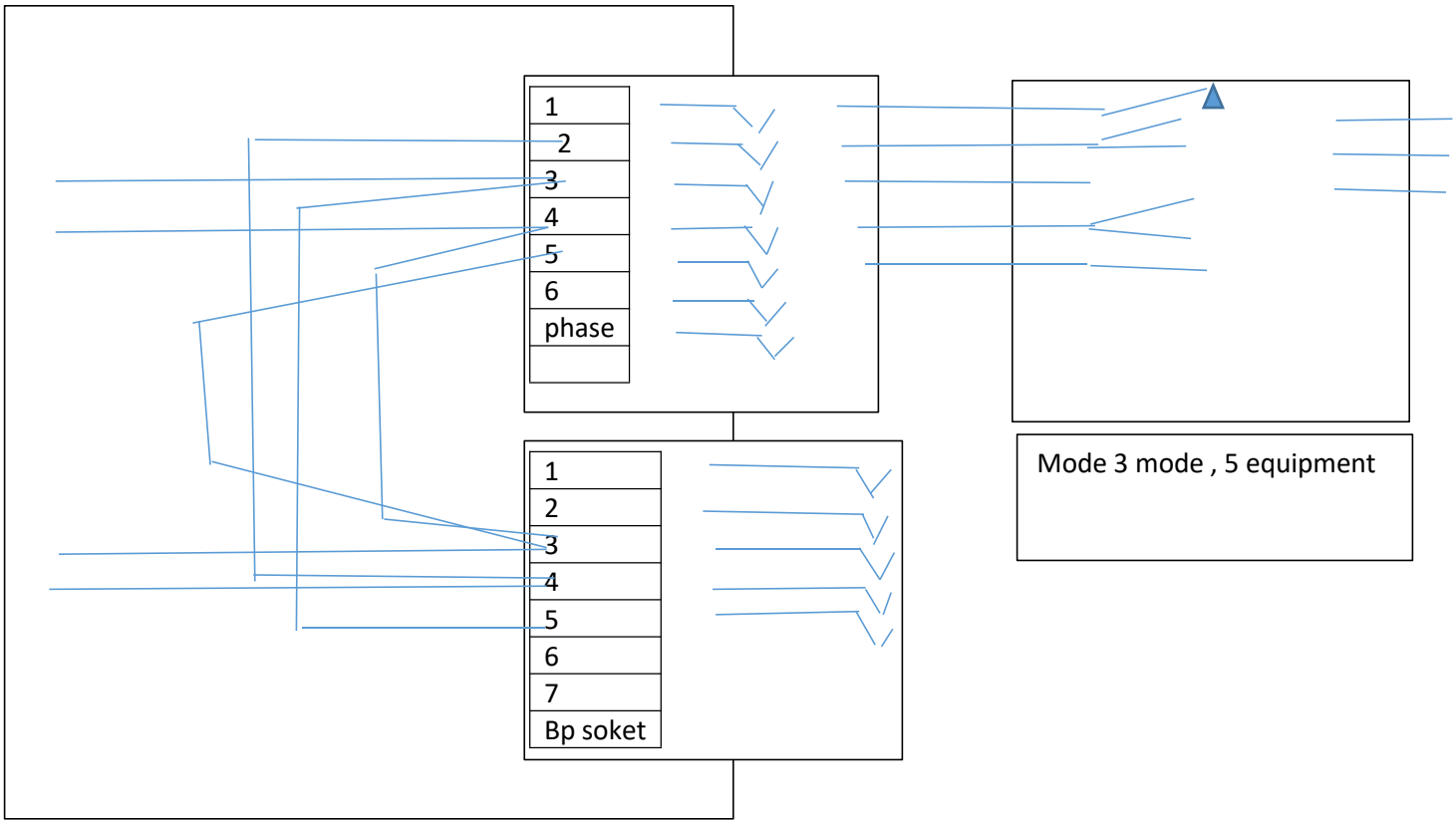

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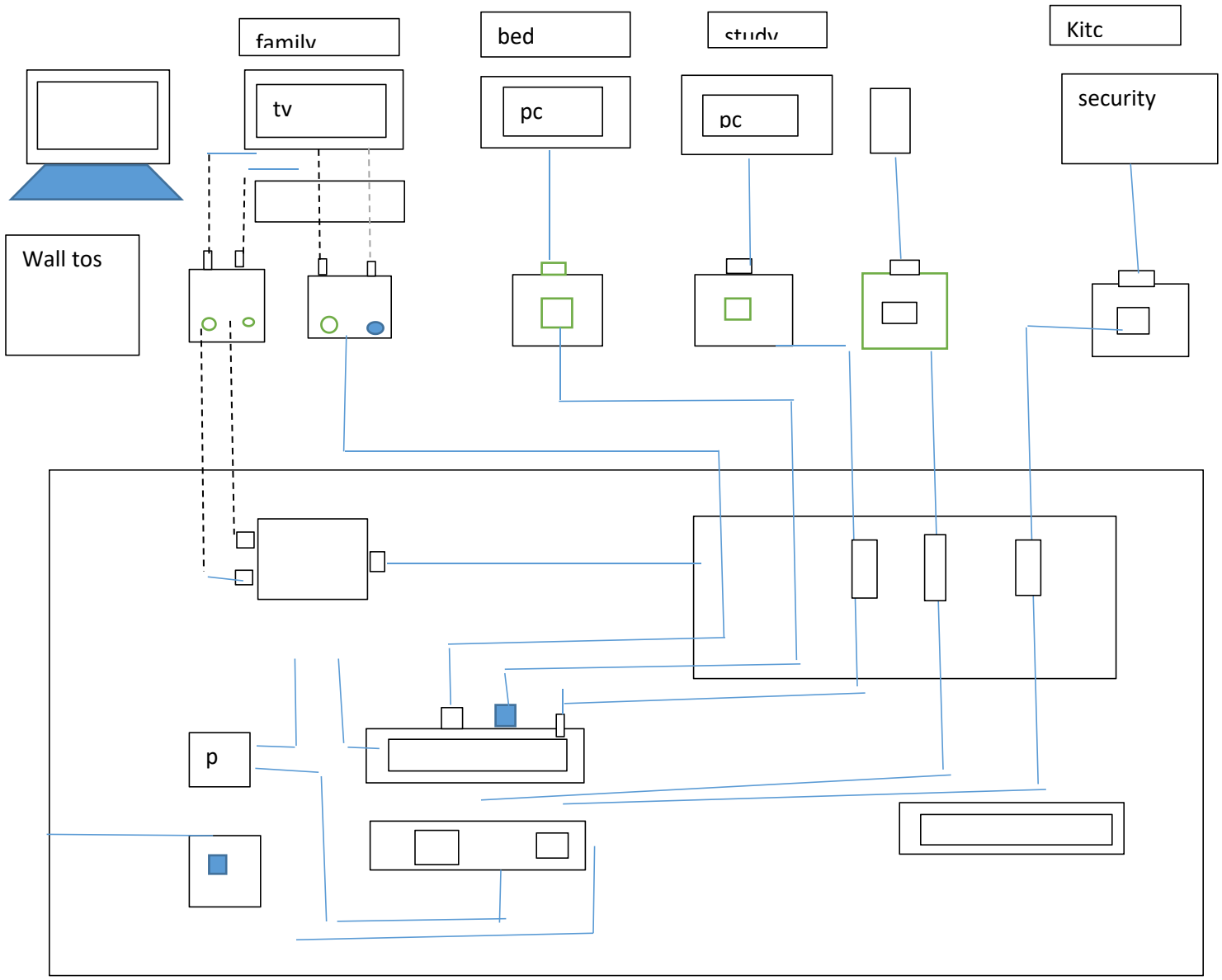

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Coaxial sock NTD

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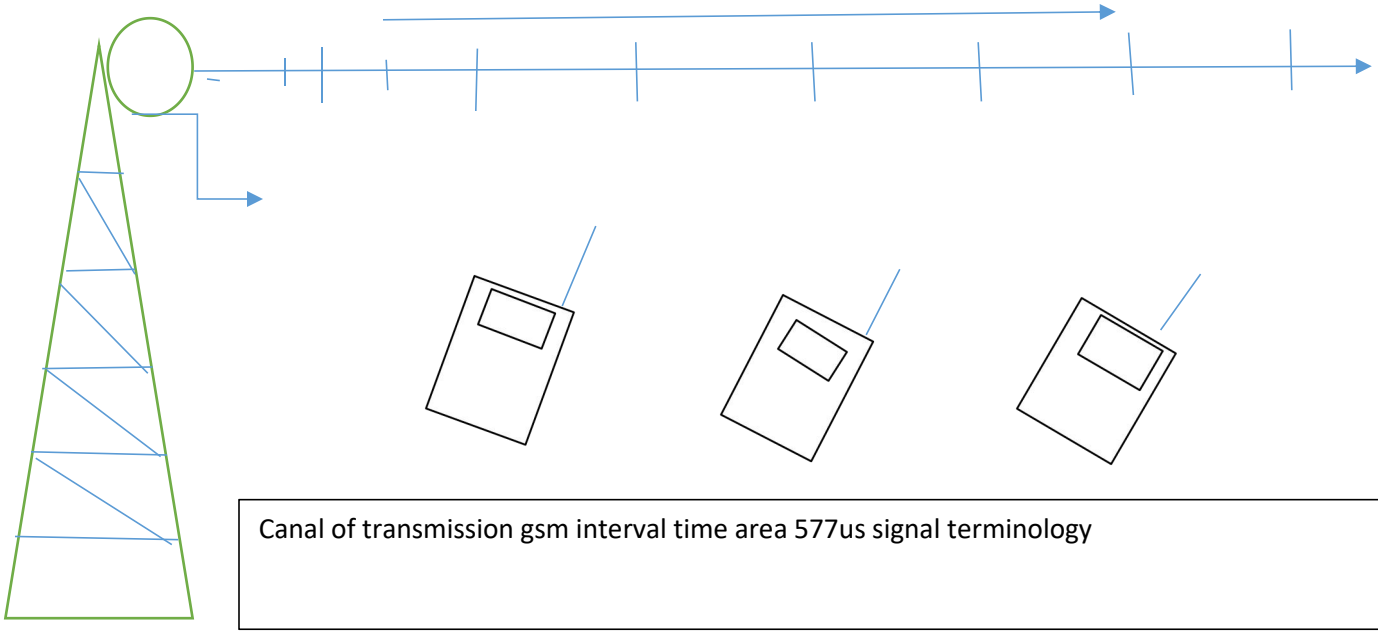
OPTIC



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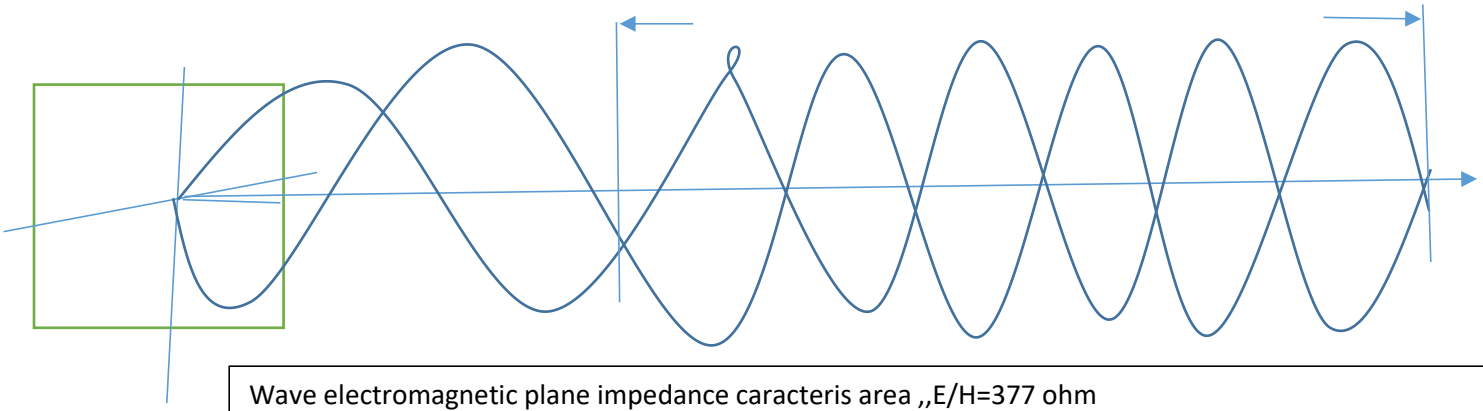

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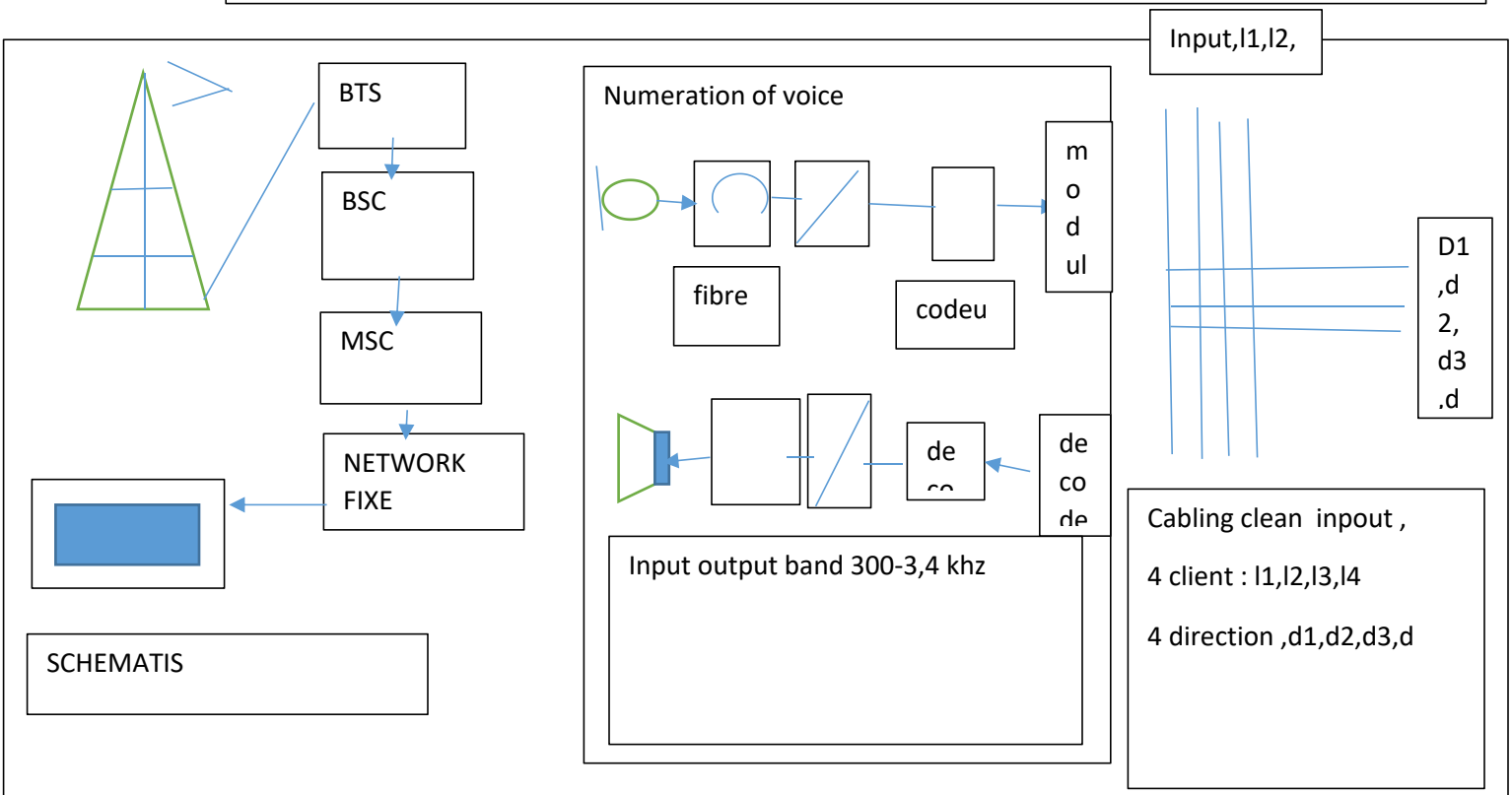

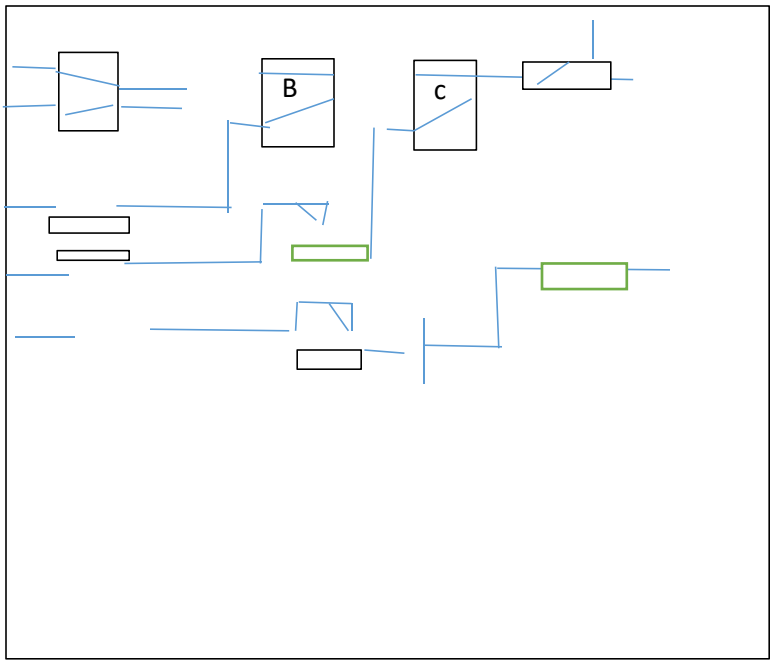

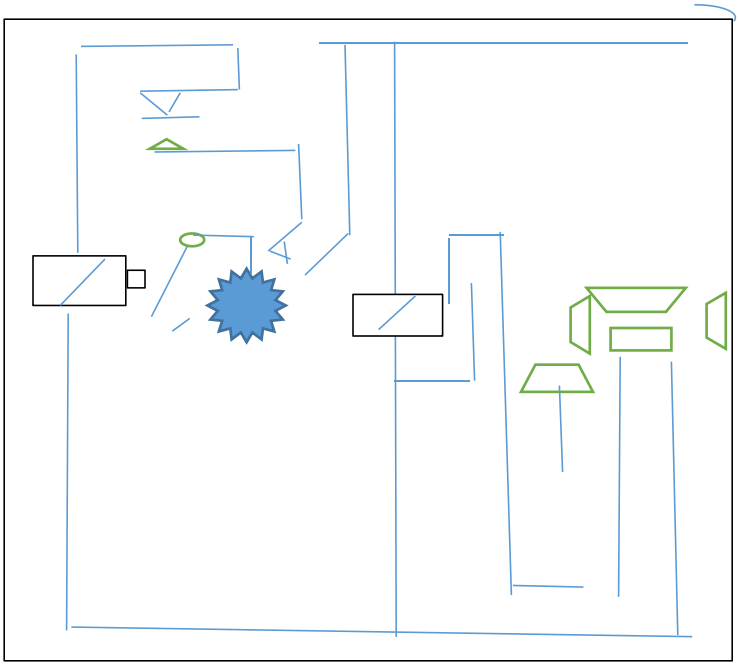

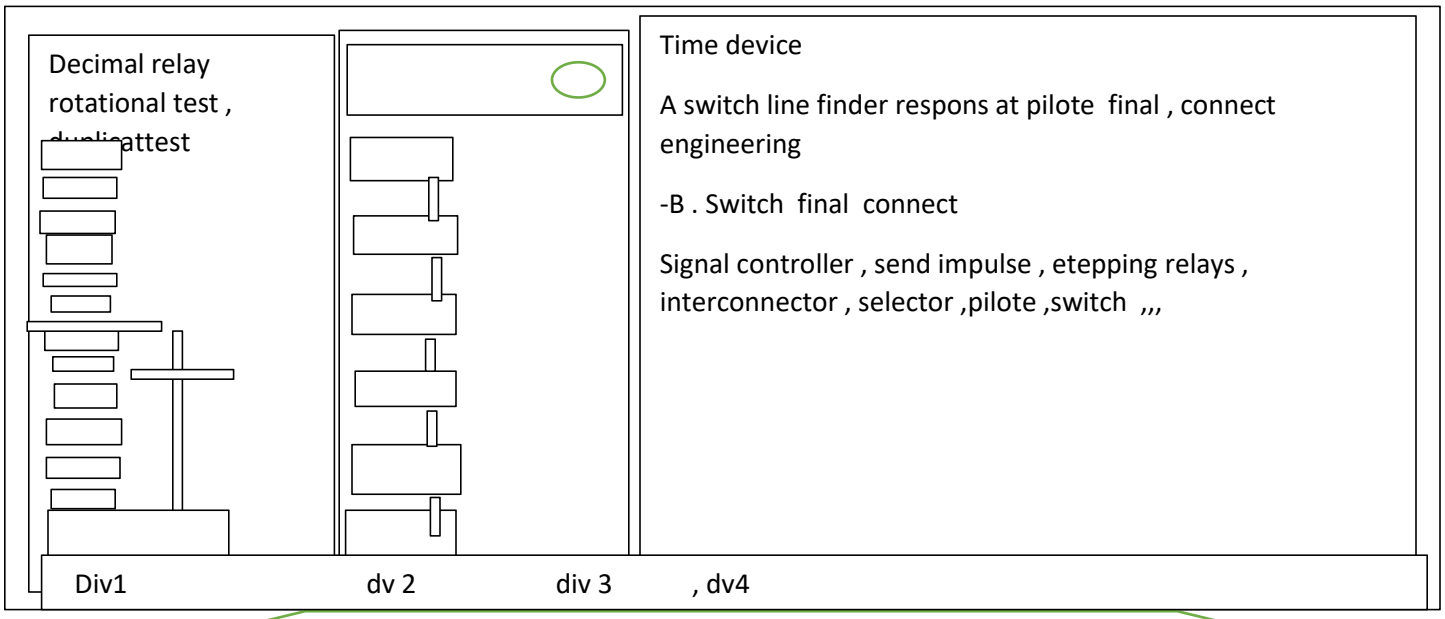

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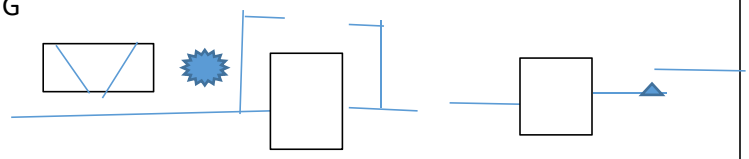

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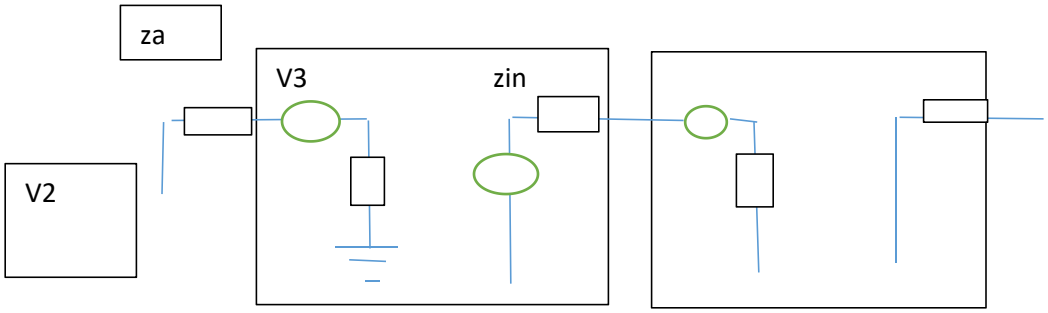

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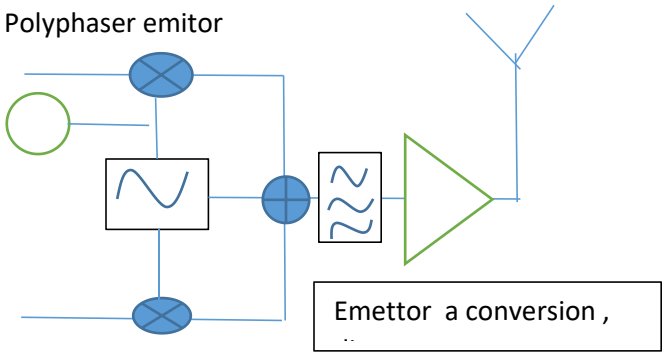

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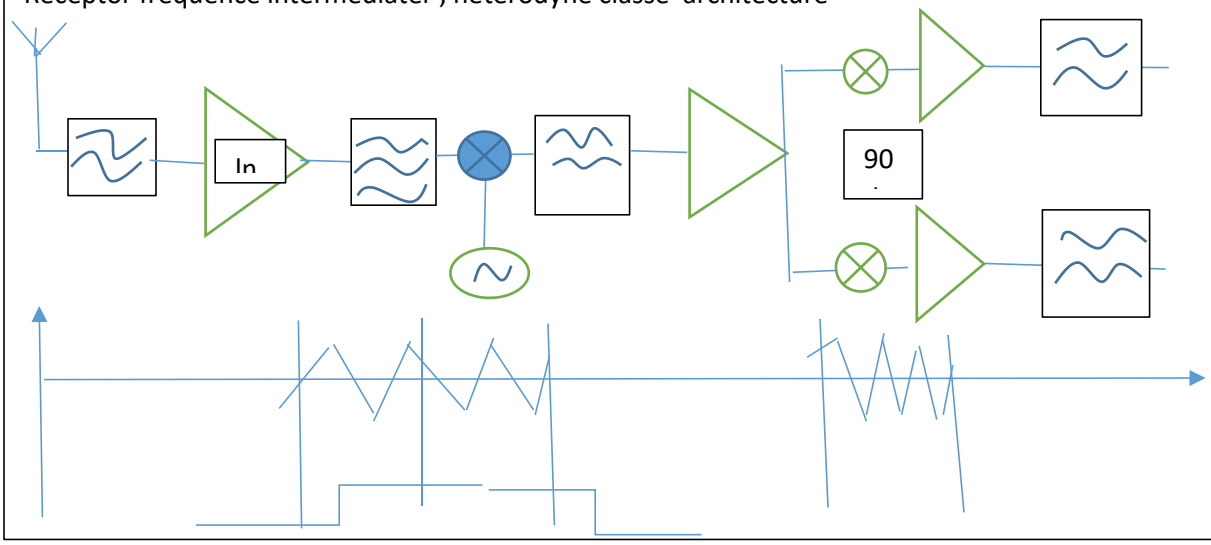

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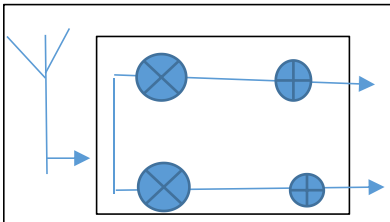

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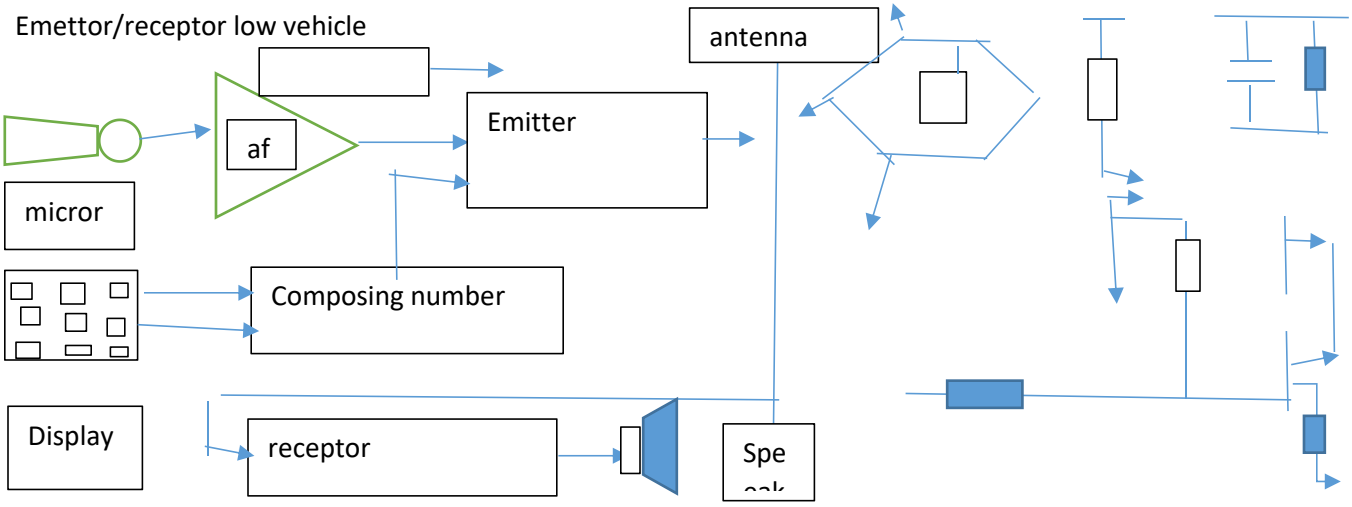
Emettor/receptor low vehicle



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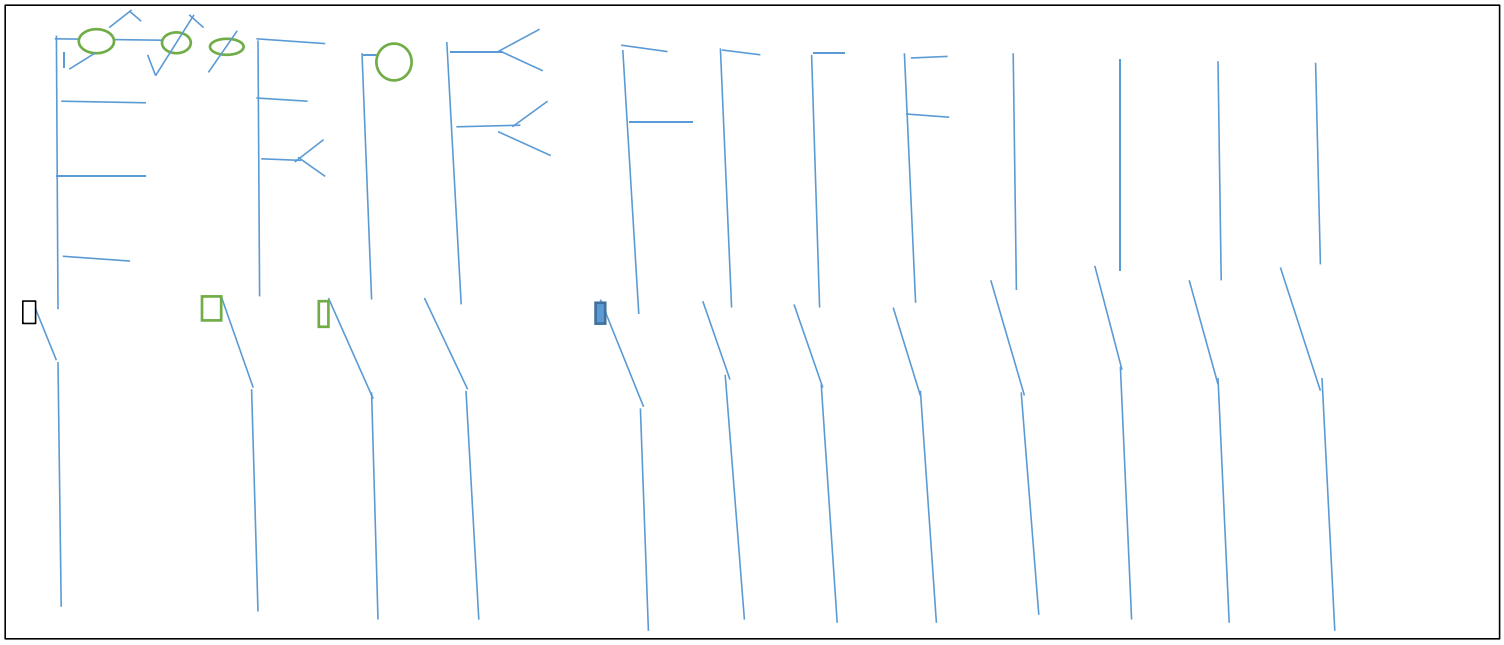

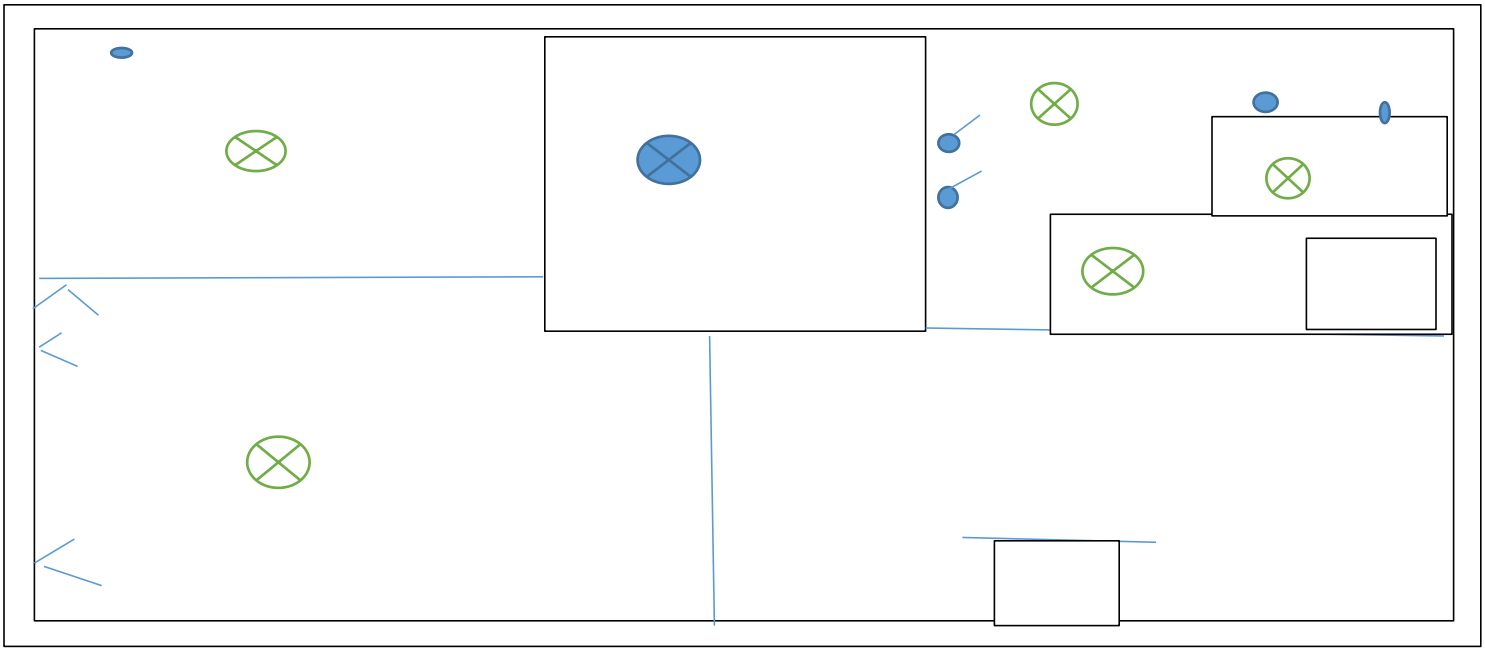

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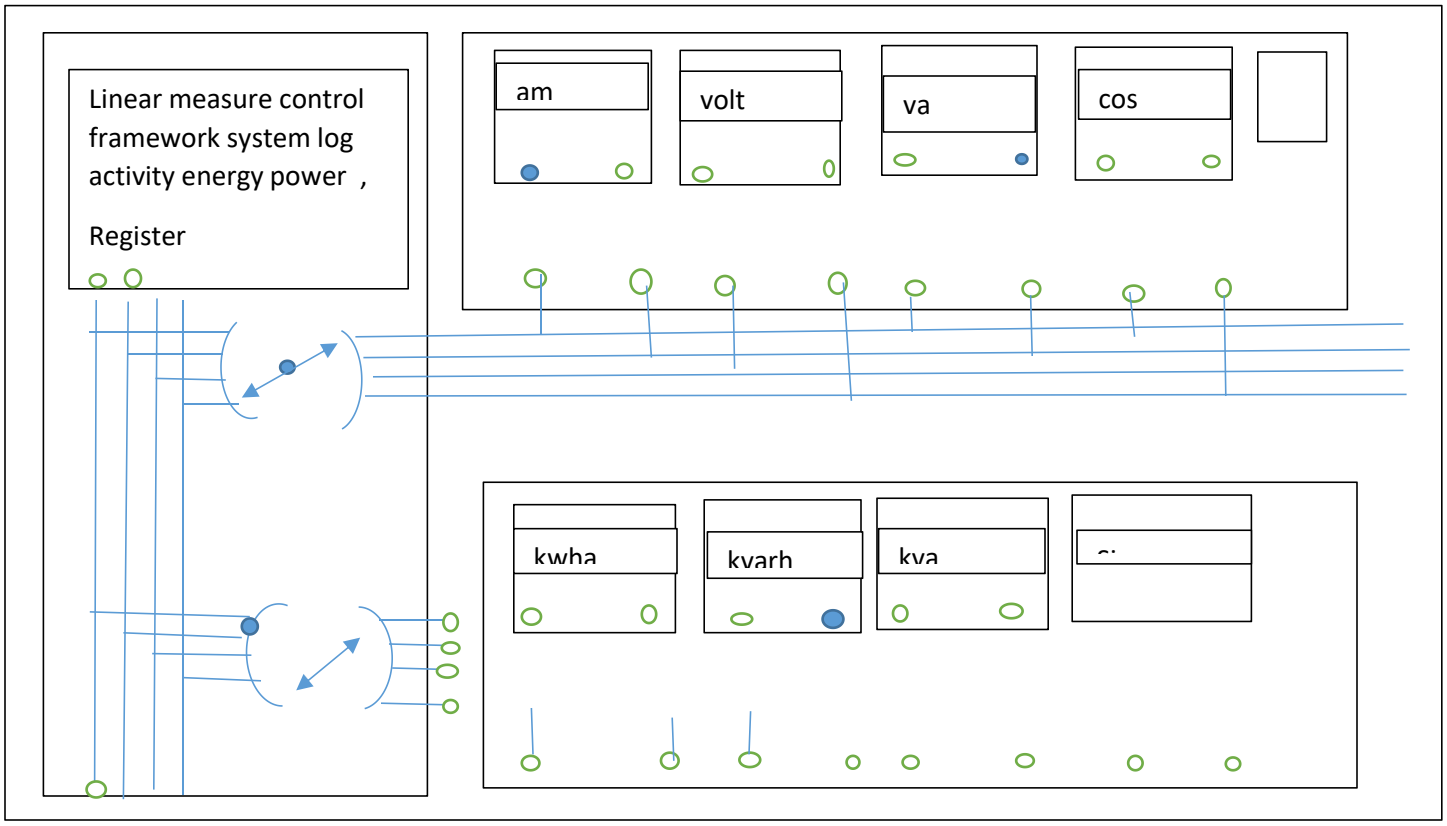
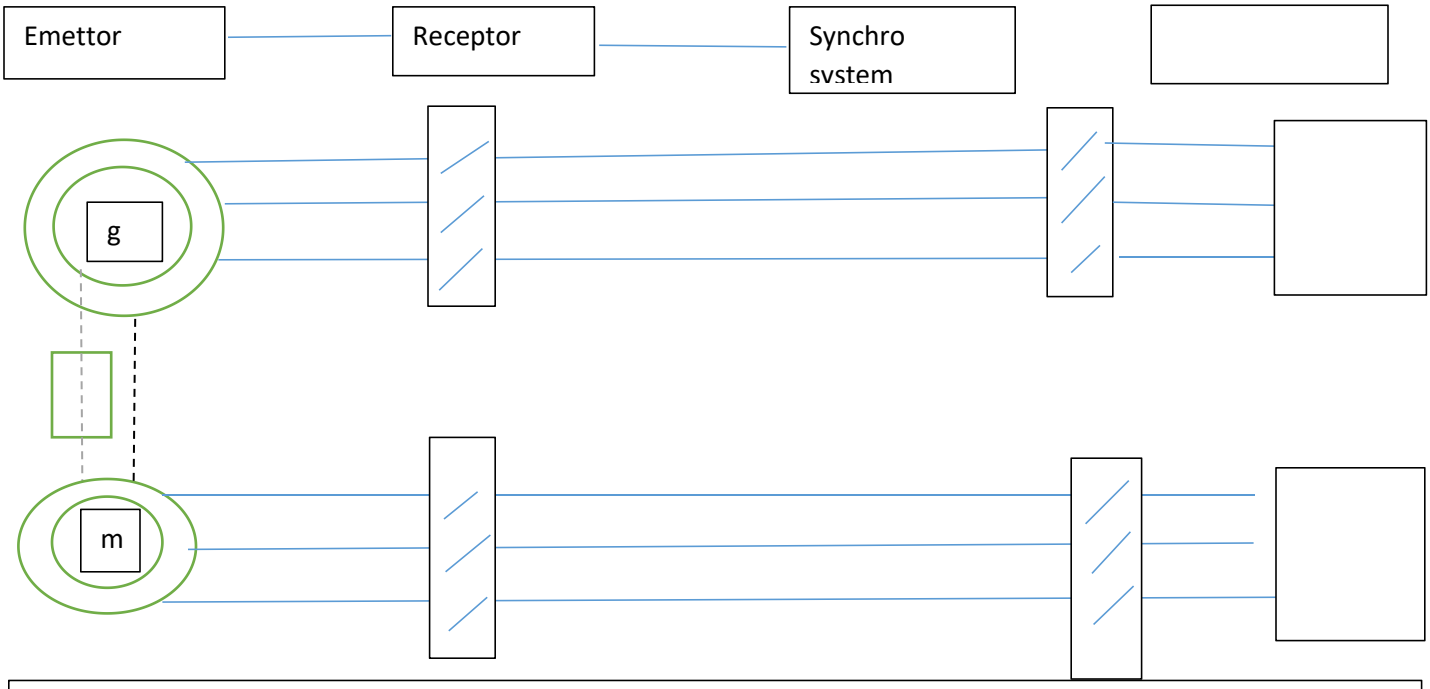
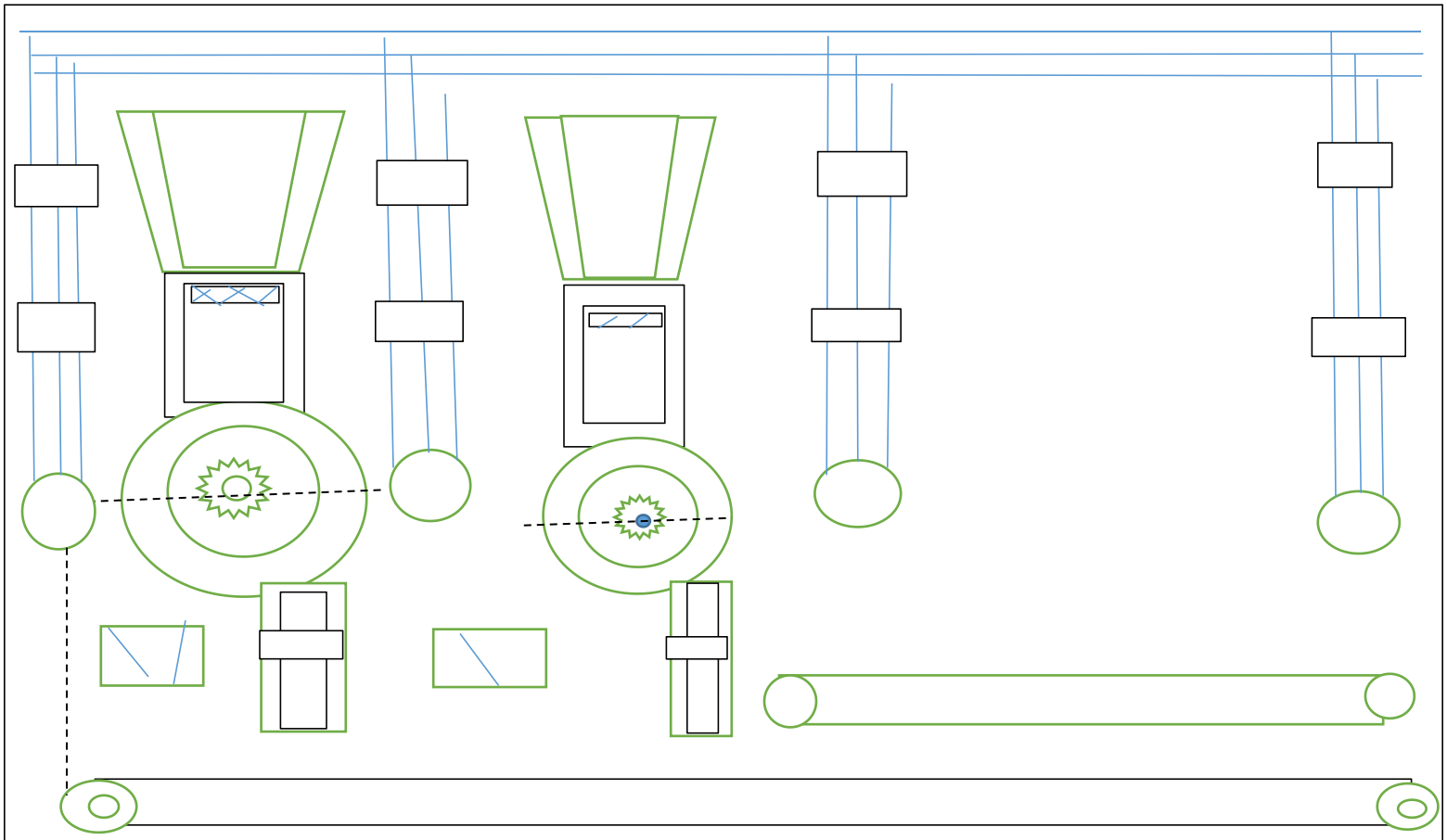
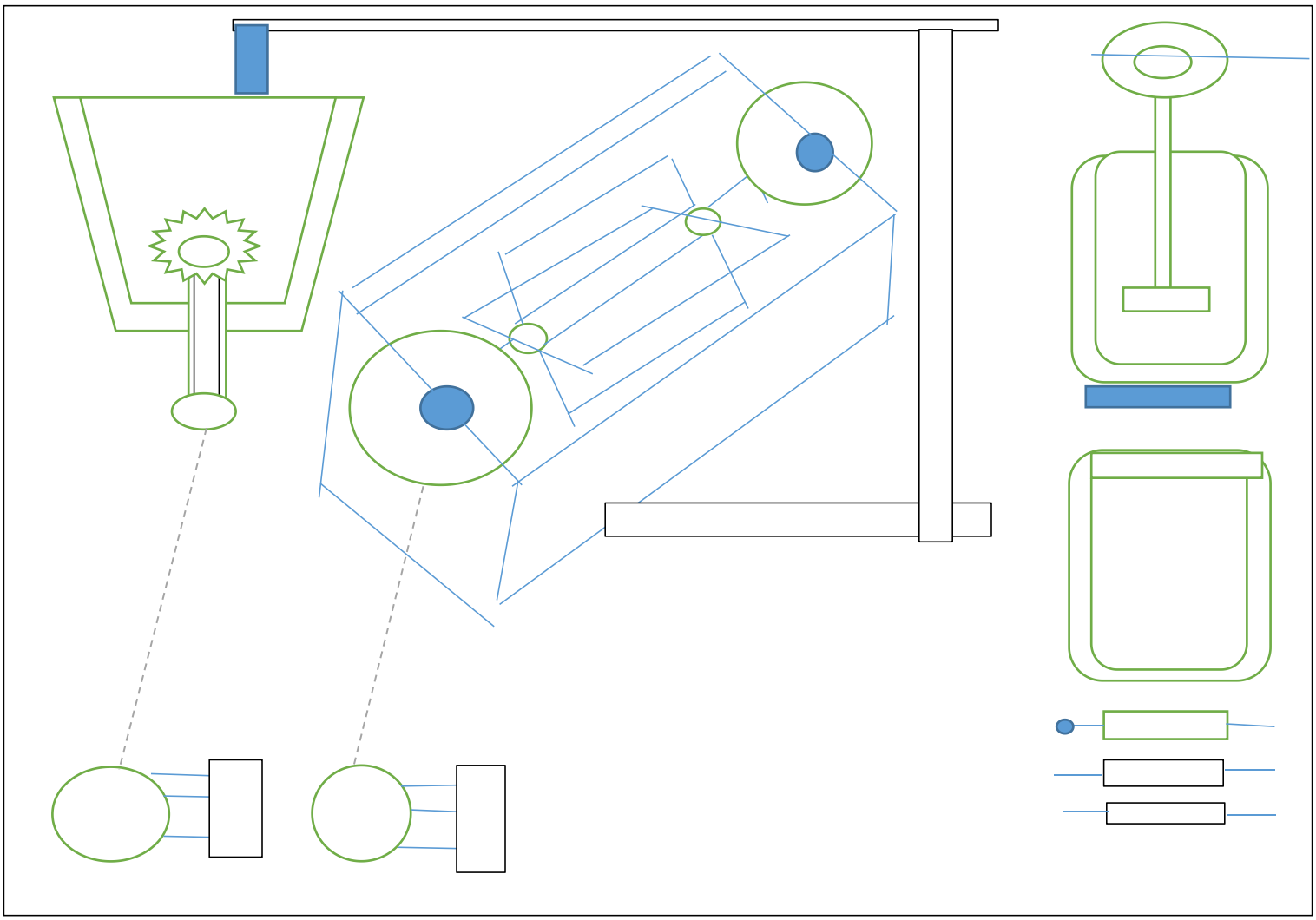

Linear measure control framework system log activity energy power ,
Register
am
volt
va
cos
kwha
kvarh
kva


Emettor
Receptor
Synchro system
g
m





$$(x+a)^n = \sum_{k=0}^{n} \binom{n}{k} x^k a^{n-k}$$

$$A = \pi r^2$$

AREA CIRCLE $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots, \quad -\infty < x < \infty$

$$\mathbf{r} = \frac{1}{2}\mathbf{a}t^2 + \mathbf{v_o}t + \mathbf{r_0}$$

ACCELERATION

$$(1+x)^n = 1 + \frac{nx}{1!} + \frac{n(n-1)x^2}{2!} + \ldots$$

$$\int_{-\infty}^{\infty} e^{-x^2} dx$$
$$= \left[\int_{-\infty}^{\infty} e^{-x^2} dx \int_{-\infty}^{\infty} e^{-y^2} dy\right]^{1/2}$$
$$= \left[\int_0^{2\pi} \int_0^{\infty} e^{-r^2} r \mathrm{d}r \mathrm{d}\theta\right]^{1/2}$$

$$\begin{pmatrix} U(t) \\ V(t) \\ W(t) \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos Rt & -\sin Rt \\ 0 & \sin Rt & \cos Rt \end{pmatrix} \begin{pmatrix} U(0) \\ V(0) \\ W(0) \end{pmatrix}$$

ROTATIONEL$\vec{F} = m\vec{a}$

$$\boldsymbol{\nabla} \cdot \boldsymbol{\nabla}\psi = \frac{\partial^2 \psi}{\partial x^2} + \frac{\partial^2 \psi}{\partial y^2} + \frac{\partial^2 \psi}{\partial z^2}$$
$$= \frac{1}{r^2 \sin\theta}\left[\sin\theta \frac{\partial}{\partial r}\left(r^2 \frac{\partial \psi}{\partial r}\right) + \frac{\partial}{\partial \theta}\left(\sin\theta \frac{\partial \psi}{\partial \theta}\right) + \frac{1}{\sin\theta}\frac{\partial^2 \psi}{\partial \varphi^2}\right]$$

```
Sub Macro1()
'
' Macro1 Macro
' visual basic atm program .sten object by system .event )hand
' "&chr(10)&"public class transaction box
' "&chr(10)&"const service as decimal =6.5
' "&chr(10)&"const pin as integer +9343
' "&chr(10)&"dim balance as decimal =150
' "&chr(10)&"private sub label 12_click (by sender System.object event arg handles labe
'
End Sub
Sub Macro2()
'
' Macro2 Macro
' type meter three phase ac static watt hous smart
' "&chr(10)&"metering algorith
' "&chr(10)&"accuracy  nomial voltage  mettering frequence metering const functionality current sensors energy pulse energy temper detection remote communication iec 62056 extrevm internal battery
'
    ActiveWindow.ActivePane.VerticalPercentScrolled = 205
    ActiveWindow.ActivePane.VerticalPercentScrolled = 146
    Selection.TypeText Text:= _
        "-------------------------------------------------------"
    Selection.TypeText Text:= _
        "-------------------------------------------------------"
    Selection.TypeText Text:="-------"
    Selection.TypeParagraph
    Selection.PasteAndFormat (wdFormatOriginalFormatting)
```

```
ActiveWindow.ActivePane.VerticalPercentScrolled = 146
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
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Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.Paste
ActiveDocument.Save
ActiveWindow.ActivePane.VerticalPercentScrolled = 207
```

```
    ActiveWindow.ActivePane.VerticalPercentScrolled = 202
    ActiveWindow.ActivePane.VerticalPercentScrolled = 197
    ActiveWindow.ActivePane.LargeScroll Down:=1
    ActiveWindow.ActivePane.VerticalPercentScrolled = -75
    ActiveWindow.ActivePane.VerticalPercentScrolled = -41
    Windows("Doc8 drawing tshingombe fiston").Activate
    Windows("Doc2 drawing tshingombe").Activate
    ActiveWindow.ActivePane.VerticalPercentScrolled = 127
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ChangeFileOpenDirectory "C:\Users\Library SIX\Desktop\"
    ActiveDocument.SaveAs2 FileName:="Doc1 tshing.docx", FileFormat:= _
        wdFormatXMLDocument, LockComments:=False, Password:="", AddToRecentFiles _
        :=True, WritePassword:="", ReadOnlyRecommended:=False, EmbedTrueTypeFonts _
        :=False, SaveNativePictureFormat:=False, SaveFormsData:=False, _
        SaveAsAOCELetter:=False, CompatibilityMode:=15
    ActiveWindow.Close
    Application.Quit
End Sub
Sub Macro3()
'
' Macro3 Macro
' 170.{ “ IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=)THEN ”}  OR “SUB”_” CLICK”
' "&chr(10)&" “SELECT REGISTER .ELSE , CPU”=0 ,  ADRESSPIN = 000000000
' "&chr(10)&"180 END IF “ IF (S1=0)+(S2=0)+(S3=0)+(S4=0)+(S5=0)+(S6=0)+(S7=0)+(S8=0)THEN ”}  OR
“SUB”_” CLICK
```

```
' "&chr(10)&"EXECU
'
    Application.Run MacroName:="frm1"
End Sub
Sub Macro4()
'
' Macro4 Macro
' 170.{ “ IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=0)THEN ”}  OR “SUB”_” CLICK”
' "&chr(10)&" SELECT REGISTER .ELSE , CPU ,
' "&chr(10)&"180 END IF “ IF (S1=1)+(S2=1)+(S3=1)+(S4=1)+(S5=1)+(S6=1)+(S7=1)+(S8=1)THEN ”}  OR
“SUB”_” CLICK
' "&chr(10)&"EXECUTION LOOP
'


'
    Application.Run MacroName:="frm1"
    ActiveWindow.ActivePane.VerticalPercentScrolled = 119
    Selection.Copy
    Application.Run MacroName:="frm1"
End Sub
Sub Macro5()
'
' Macro5 Macro
' 10.INPUT X1
' "&chr(10)&"20. INPUT .X2
' "&chr(10)&"30. INPUT X3
' "&chr(10)&"40. INPUT X4
' "&chr(10)&"50,IN[UT X5
' "&chr(10)&"60. INPUT X6
```

```
' "&chr(10)&"60.INPUT .X7.
'

' "&chr(10)&" 70.OUTPUT  S1
' "&chr(10)&"80.OUTPUT.S2
' "&chr(10)&"90,OUTPUT S3
' "&chr(10)&"100.OUTPUT S4
' "&chr(10)&"110.OUTPUT S5
' "&chr(10)&"120 OUTPUT S6
' "&chr(10)&"130.OUTPUT S7
' "&chr(10)&"140.OUTPUT
' "&chr(10)&"150 SELECT REGISTER
' "&chr(10)&"150 OUTPUT HARDW
'
   Application.Run MacroName:="frm1"
End Sub
Sub frm1()
'
' frm1 Macro
'
'

End Sub
Sub Macro6()
'
' Macro6 Macro
' ·       Signal Integration:
'
```

```
' "&chr(10)&"o   To measure the total amount of analyte over time, integration of the sensor signal I(t)I(t) is performed: $$ Q = \int_0^T I(t) \, dt $$
'


' "&chr(10)&"o   Where QQ is the total charge, I(t)I(t) is the current as a function of time,
'
End Sub
Sub Macro7()
'
' Macro7 Macro
' Derivative Calculations:
' "&chr(10)&"·       Rate of Change:
'


' "&chr(10)&"o   To assess the rate of change of the analyte concentration, the derivative of the sensor signal can be calculated: $$ \frac{dC}{dt} = k \frac{dI}{dt} $$
'


' "&chr(10)&"o   Where CC is the concentration, II is t
'
   Application.Run MacroName:="Macro1"
End Sub
Sub Macro8()
'
' Macro8 Macro
' Water Splitting for Hydrogen Production:
' "&chr(10)&"·       Integral Calculations:
'
```

```
' "&chr(10)&"o   Total Hydrogen Production: $$ H_2 (g) = \int_0^T \left( \frac{I(t)}{2F} \right) dt $$
'


' "&chr(10)&"§  Where H2H_2 is the amount of hydrogen gas produced, I(t)I(t) is the current as a f
'
End Sub
Sub Macro9()
'
' Macro9 Macro
' Metal Plating:
' "&chr(10)&"·       Integral Calculations:
'


' "&chr(10)&"o   Total Metal Deposited: $$ M = \int_0^T \left( \frac{I(t) \cdot M}{nF} \right) dt $$
'


' "&chr(10)&"§  Where MM is the mass of the metal deposited, I(t)I(t) is the current as a function of time, nn is the number o
'
End Sub
Sub Macro10()
'
' Macro10 Macro
'
' "&chr(10)&"Energy Efficiency:
' "&chr(10)&"·       Integral Calculations:
'


' "&chr(10)&"o   Energy Consumption: $$ E = \int_0^T P(t) \, dt $$
```

```
'

' "&chr(10)&"§  Where EE is the total energy consumption, P(t)P(t) is the power consumption as a function of time, and TT is the total time period.
'

' "&chr(10)&"Res
'
    Application.Run MacroName:="Macro1"
End Sub
Sub Macro11()
'
' Macro11 Macro
'
' "&chr(10)&"o   Total Time Spent on Repetitive Tasks: $$ T = \int_0^N t_i \, di $$
'

' "&chr(10)&"§  Where TT is the total time, tit_i is the time spent on each task, and NN is the total number of tasks.
'

' "&chr(10)&"·       Derivative Calculations:
'

' "&chr(10)&"o   Rate of Task Completion: $$ \
'
End Sub
Sub Macro12()
'
```

```
' Macro12 Macro
'
' "&chr(10)&"·       Integral Calculations:
'

' "&chr(10)&"o   Total Efficiency Gain: $$ E = \int_0^T \frac{P_a - P_m}{P_m} \, dt $$
'

' "&chr(10)&"§  Where EE is the efficiency gain, PaP_a is the productivity with automation, PmP_m is the productivity without automation, and TT is the to
'
End Sub
Sub Macro13()
'
' Macro13 Macro
' Camera Operation and Techniques:
'

' "&chr(10)&"·       Integral Calculations:
'

' "&chr(10)&"o   Total Recording Time: $$ T_{\text{recording}} = \int_0^N t_i \, di $$
'

' "&chr(10)&"§  Where TrecordingT_{\text{recording}} is the total recording time, tit_i is the time for each segment, an
'
End Sub
Sub Macro14()
```

'

' Macro14 Macro

' · Use the power flow equations: $$P_i = V_i \sum_{j=1}^{n} V_j (G_{ij} \cos \theta_{ij} + B_{ij} \sin \theta_{ij})$$ $$Q_i = V_i \sum_{j=1}^{n} V_j (G_{ij} \sin \theta_{ij} - B_{ij} \cos \theta_{ij})$$ Where GijG_{ij} and BijB_{ij} are the conducta

'

End Sub

Sub Macro15()

'

' Macro15 Macro

'

' "&chr(10)&"4. Control Systems

' "&chr(10)&"· Transfer Functions: H(s)=Y(s)X(s)H(s) = \frac{Y(s)}{X(s)}

'

' "&chr(10)&"· Stability Analysis: Using Routh-Hurwitz criterion, Nyquist criterion, and Bode plots

'

'

End Sub

Sub Macro16()

'

' Macro16 Macro

' - to calculate the Laplace and Fourier series Fourier a random vibrational signal ,signal aleatoire vibratoire in the context break down into a few steps.

' "&chr(10)&"1. Fourier series : the Fourier series and cosine function for periodic function \ (ft)\) with per

'

End Sub

Sub Macro17()

'

' Macro17 Macro

' Biot-Savart Law:

' "&chr(10)&" The law is mathematically expressed as:

' "&chr(10)&"

' "&chr(10)&" B=μ04p?I dl×r^r2\mathbf{B} = \frac{\mu_0}{4\pi} \int \frac{I \, d\mathbf{l} \times \hat{r}}{r^2}B=4pμ0???r2Idl×r^?

' "&chr(10)&" Where:

' "&chr(10)&"

' "&chr(10)&" B\mathbf{B}B is the magnetic field at a point,

' "&chr(10)&" μ0\mu_0μ0? i

'

End Sub

Sub Macro18()

'

' Macro18 Macro

' 2. Scope and Framework Applications

' "&chr(10)&"Power Systems:

' "&chr(10)&"· Energy Consumption Modeling: Apply integral formulations like: $$E = \int P(t) \, dt$$ Where P(t)P(t) is the power as a function of time and EE is the cumulativ

'

End Sub

Sub Macro19()

'

' Macro19 Macro

' 3. Integrating Market Trends

' "&chr(10)&"HNC Level Tasks:

' "&chr(10)&"· Derive load equations for single-phase circuits using simple relationships: $$I = \frac{P}{V}$$ Where II is current, PP is power, and VV is voltage.

' "&chr(10)&"HND Level Scenarios:

```
' "&chr(10)&"· Explore adv
'
End Sub
Sub Macro20()
'
' Macro20 Macro
'
' "&chr(10)&"       Module subject average career guidance:
' "&chr(10)&"
' "&chr(10)&"
' "&chr(10)&"
' "&chr(10)&"       -Module career  (sum "a"+"b"+"c") ;(sum "d"+"e"+"f");("g"+"h"+"I").;
' "&chr(10)&"
' "&chr(10)&"
'


'
End Sub
Sub Macro21()
'
' Macro21 Macro
' F=wICASS·MICASS+wEISA·MEISA,F = w_{\text{ICASS}} \cdot M_{\text{ICASS}} + w_{\text{EISA}} \cdot
M_{\text{EISA}},
' "&chr(10)&"where wICASS=0.4w_{\text{ICASS}} = 0.4 and wEISA=0.6w_{\text{EISA}} = 0.6.
' "&chr(10)&"Example: For a student wi
'
End Sub
Sub Macro22()
'
```

```
' Macro22 Macro
' Ptotal=?0Tf(t) dt,P_{\text{total}} = \int_0^T f(t) \, dt,
' "&chr(10)&"where f(t)f(t): rate of improvement over a semester tt.
' "&chr(10)&"Example: Given f(t)=3t2+2tf(t) = 3t^2 + 2t, compute PtotalP_{\text{total}} over T=6T = 6:
' "&chr(10)&"
' "&chr(10)&"Ptotal=?06(3t2+2t) dt=[t3+t2]06=216+36=252
'
End Sub
Sub Macro23()
'
' Macro23 Macro
'
' "&chr(10)&"Q=?0TkA?T dt,Q = \int_0^T k A \Delta T \, dt,
' "&chr(10)&"where kk: thermal conductivity, AA: surface area, ?T\Delta T: temperature gradient.
' "&chr(10)&"Example: For k=0.8 W/mKk = 0.8 \, \text{W/mK}, A=2 m2A = 2 \,
'
End Sub
```

```
Sub Macro1()
'
' Macro1 Macro
' visual basic atm program .sten object by system .event )hand
' "&chr(10)&"public class transaction box
' "&chr(10)&"const service as decimal =6.5
' "&chr(10)&"const pin as integer +9343
' "&chr(10)&"dim balance as decimal =150
' "&chr(10)&"private sub label 12_click (by sender System.object event arg handles labe
'
End Sub
Sub Macro2()
'
' Macro2 Macro
' type meter three phase ac static watt hous smart
' "&chr(10)&"metering algorith
' "&chr(10)&"accuracy  nomial voltage  mettering frequence metering const functionality current sensors energy pulse energy temper detection remote communication iec 62056 extrevm internal battery
'
    ActiveWindow.ActivePane.VerticalPercentScrolled = 205
    ActiveWindow.ActivePane.VerticalPercentScrolled = 146
    Selection.TypeText Text:= _
        "-----------------------------------------------------------"
    Selection.TypeText Text:= _
        "-----------------------------------------------------------"
    Selection.TypeText Text:="-------"
    Selection.TypeParagraph
    Selection.PasteAndFormat (wdFormatOriginalFormatting)
```

```
ActiveWindow.ActivePane.VerticalPercentScrolled = 146
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
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Selection.TypeParagraph
Selection.TypeParagraph
Selection.Paste
ActiveDocument.Save
ActiveWindow.ActivePane.VerticalPercentScrolled = 207
```

```
    ActiveWindow.ActivePane.VerticalPercentScrolled = 202
    ActiveWindow.ActivePane.VerticalPercentScrolled = 197
    ActiveWindow.ActivePane.LargeScroll Down:=1
    ActiveWindow.ActivePane.VerticalPercentScrolled = -75
    ActiveWindow.ActivePane.VerticalPercentScrolled = -41
    Windows("Doc8 drawing tshingombe fiston").Activate
    Windows("Doc2 drawing tshingombe").Activate
    ActiveWindow.ActivePane.VerticalPercentScrolled = 127
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ChangeFileOpenDirectory "C:\Users\Library SIX\Desktop\"
    ActiveDocument.SaveAs2 FileName:="Doc1 tshing.docx", FileFormat:= _
        wdFormatXMLDocument, LockComments:=False, Password:="", AddToRecentFiles _
        :=True, WritePassword:="", ReadOnlyRecommended:=False, EmbedTrueTypeFonts _
        :=False, SaveNativePictureFormat:=False, SaveFormsData:=False, _
        SaveAsAOCELetter:=False, CompatibilityMode:=15
    ActiveWindow.Close
    Application.Quit
End Sub
Sub Macro3()
'
' Macro3 Macro
' 170.{ “ IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=)THEN ”}  OR “SUB”_” CLICK”
' "&chr(10)&" “SELECT REGISTER .ELSE , CPU”=0 ,  ADRESSPIN = 000000000
' "&chr(10)&"180 END IF “ IF (S1=0)+(S2=0)+(S3=0)+(S4=0)+(S5=0)+(S6=0)+(S7=0)+(S8=0)THEN ”}  OR
“SUB”_” CLICK
```

```
' "&chr(10)&"EXECU
'
    Application.Run MacroName:="frm1"
End Sub
Sub Macro4()
'
' Macro4 Macro
' 170.{ “ IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=0)THEN ”}  OR “SUB”_” CLICK”
' "&chr(10)&" SELECT REGISTER .ELSE , CPU ,
' "&chr(10)&"180 END IF “ IF (S1=1)+(S2=1)+(S3=1)+(S4=1)+(S5=1)+(S6=1)+(S7=1)+(S8=1)THEN ”}  OR
“SUB”_” CLICK
' "&chr(10)&"EXECUTION LOOP
'


'
    Application.Run MacroName:="frm1"
    ActiveWindow.ActivePane.VerticalPercentScrolled = 119
    Selection.Copy
    Application.Run MacroName:="frm1"
End Sub
Sub Macro5()
'
' Macro5 Macro
' 10.INPUT X1
' "&chr(10)&"20. INPUT .X2
' "&chr(10)&"30. INPUT X3
' "&chr(10)&"40. INPUT X4
' "&chr(10)&"50,IN[UT X5
' "&chr(10)&"60. INPUT X6
```

```
' "&chr(10)&"60.INPUT .X7.
'

' "&chr(10)&" 70.OUTPUT  S1
' "&chr(10)&"80.OUTPUT.S2
' "&chr(10)&"90,OUTPUT S3
' "&chr(10)&"100.OUTPUT S4
' "&chr(10)&"110.OUTPUT S5
' "&chr(10)&"120 OUTPUT S6
' "&chr(10)&"130.OUTPUT S7
' "&chr(10)&"140.OUTPUT
' "&chr(10)&"150 SELECT REGISTER
' "&chr(10)&"150 OUTPUT HARDW
'
   Application.Run MacroName:="frm1"
End Sub
Sub frm1()
'
' frm1 Macro
'
'

End Sub
Sub Macro24()
'
' Macro24 Macro
'
' "&chr(10)&"   \(f(x,y)\) the partial derivatives with respect to \(x\)
' "&chr(10)&"
```

```
' "&chr(10)&"   Is denoted as \(\ frac{\ partial f }{ partial x}\) and with ,
' "&chr(10)&"
' "&chr(10)&"   Respect to \ ( y\) as \(\ frac {\ partial f }{\ partial ,y }\)
' "&chr(10)&"
' "&chr(10)&"   Examp : \[ funct \[ f( x,y)=x^2y+3xy^3\]
' "&chr(10)&"
' "&chr(10)&"   * Calcu
'
End Sub
Sub Macro6()
'
' Macro6 Macro
'
' "&chr(10)&"   \(f(x,y)\) the partial derivatives with respect to \(x\)
' "&chr(10)&"
' "&chr(10)&"   Is denoted as \(\ frac{\ partial f }{ partial x}\) and with ,
' "&chr(10)&"
' "&chr(10)&"   Respect to \ ( y\) as \(\ frac {\ partial f }{\ partial ,y }\)
' "&chr(10)&"
' "&chr(10)&"   Examp : \[ funct \[ f( x,y)=x^2y+3xy^3\]
' "&chr(10)&"
' "&chr(10)&"   * Calcu
'
End Sub
Sub Macro7()
'
' Macro7 Macro
'
```

```
' "&chr(10)&"   \( f(x,y)\), the total derivatives \ ( DF \) is given by : \[ DF = \ frac { \ partial f }{\ partial
x }sx +\ frac{ \ partial }{ \ partial y } St \ ]

' "&chr(10)&"

' "&chr(10)&"   Using the previous : \ [ DF = 2xy+ 2y^2)

' "&chr(10)&"

'



'

End Sub

Sub Macro8()

'

' Macro8 Macro

'   1. Fourier series : the Fourier series and cosine function for periodic function \ ( ft)\) with period ( t)
the Fourier series is.

' "&chr(10)&"

' "&chr(10)&"   f(t)= a 0+\ sum ${n= 1}{\ infty}

' "&chr(10)&"

' "&chr(10)&"   \ left + a_ n \ cos \ left \ left + } frac { 2\ pi not }{T}

' "&chr(10)&"

' "&chr(10)&"   \ right ) + b _

'

End Sub

Sub Macro9()

'

' Macro9 Macro

'

' "&chr(10)&"   .\[ R-{\ text t{ total }}= R1+R2+R3\]

' "&chr(10)&"

' "&chr(10)&"   . Substituting the values \[ R - { \ text { total }}= 10\.\ text , { ohms }+ 20\, text{ ohms}+30\,
text {ohms}\], calculating ,\[ R - { \ text { total /}} = 60\\ text { ohm }\]
```

```
'


'
End Sub
Sub Macro10()
'
' Macro10 Macro
' 0
' "&chr(10)&"   [ Z =\ sqrt{R^ 2+(x-L-X_C)^2}\]
' "&chr(10)&"
' "&chr(10)&"   Where _\(x_L= 2\ pi f L \ Pi .f.c\} ( capacitive reactance ,
' "&chr(10)&"
' "&chr(10)&"   -\(X_C)=\ frac ,{1}{2\ pi.f.c}\}( capacitive reactance.
' "&chr(10)&"
' "&chr(10)&"   -|(fI) is the frequency in Hertz ( z)
' "&chr(10)&"
' "&chr(10)&"   -\(L/) is the inductance  in Hertz ( Hz )
'
End Sub
Sub Macro11()
'
' Macro11 Macro
'   The power factor ,of is defined as the ratio of real power to apparent power , \ [ \ text power
factor ,of )}=\ frac ,{P}{s}\]
' "&chr(10)&"
' "&chr(10)&"   Where : .\(P\)= real power ( w)
' "&chr(10)&"
' "&chr(10)&"   .\(S\\)= apparent power ,( VA)
'
```

```
'

End Sub

Sub Macro12()

'

' Macro12 Macro

'   \[S=\sqt{P^2+Q^2}\]

' "&chr(10)&"

' "&chr(10)&"   .value .real power (\(P\))=500w,

' "&chr(10)&"

' "&chr(10)&"   .reactive power(\Q\))=300VAR

' "&chr(10)&"

' "&chr(10)&"   - calculate apparent power ( s)\[,S=\sqt{P^2t

'



'

End Sub

Sub Macro13()

'

' Macro13 Macro

'

' "&chr(10)&"   -where .

' "&chr(10)&"

' "&chr(10)&"   |(a-O=| frac {1}{T} int- 0^ f(t)\dt)

' "&chr(10)&"

' "&chr(10)&"   .\+a-n = frac {2}{T} int_O^Y f ( t) \ cos\ left ( \ frac { 2\ Pi .n t}{ t } rigth \, DT have simple square wave function.

'
```

```
'

End Sub

Sub Macro14()

'

' Macro14 Macro

'   - the Fourier transform is used to convert a time domain signal into it frequency domain represent formula : transform \ F ( \ omega )\( of a continuous signal \ ( f(t) , e^{- j \ omega }\ dt\]

' "&chr(10)&"

' "&chr(10)&"   - where . \( f+ \ omega )\) = Fourier transform of the

'

End Sub

Sub Macro15()

'

' Macro15 Macro

'   - the la place trans is another transformation used to analyse linear time _ invariant system formula for the la place transform \ F( S)\) of function \ ( f(t)\) is \[f(s)=\ into -{O} infty } ,  f( t ) ,, e{-st } St \]

' "&chr(10)&"

' "&chr(10)&"   - \( f( s)\)= Laplace transfor

'

End Sub

Sub Macro16()

'

' Macro16 Macro

'   \|[ | dot { x}(t}=Ax(t)+By(t)\]\[y(t)=(x(t)+du(t)\]

' "&chr(10)&"

' "&chr(10)&"   Where :

' "&chr(10)&"

' "&chr(10)&"   -|(x(t)\)= state vector

' "&chr(10)&"
```

```
' "&chr(10)&"   .|(u(t)\)= Input vector

' "&chr(10)&"

' "&chr(10)&"   .\ (y( t) \)= output vector .

' "&chr(10)&"

' "&chr(10)&"   .(A\)= System .

' "&chr(10)&"

' "&chr(10)&"   .\(B\)= input matrix .

' "&chr(10)&"

' "&chr(10)&"   .|(C\) = Output matrix .

' "&chr(10)&"

' "&chr(10)&"   .\( D \ )

'

End Sub

Sub Macro17()

'

' Macro17 Macro

'   1. DC machines : speed ( n ) the speed of DC motor can be calculated using formula \[N=\ frac { V-1\
CDOT -R}{ CDOT \ Phi }\]

' "&chr(10)&"

' "&chr(10)&"   - where \ ( N\ ) = speed in Rpm ( revolution perminute .

' "&chr(10)&"

' "&chr(10)&"   - \ ( N\)= supply voltage ( v ) ,

' "&chr(10)&"

' "&chr(10)&"   -\(i\)= armature curr

'

End Sub

Sub Macro18()

'

' Macro18 Macro
```

```
'   14*. Mass balance equation : the general mass balance equation can expressed as :

' "&chr(10)&"

' "&chr(10)&"   \[\ text { input }-\ text { output }+\ { generation } \ text  consumption}=\ text
{ accumulation \ ]

' "&chr(10)&"

'



'

End Sub

Sub Macro19()

'

' Macro19 Macro

'   - for a steady state process ( where accumulation is zero the equation simplified to \[\ text { input}\
text { output}\tezt Generation}-\ text { consumption}=\]

'



'

End Sub

Sub Macro20()

'

' Macro20 Macro

'   - for a steady state process ( where accumulation is zero the equation simplified to \[\ text { input}\
text { output}\tezt Generation}-\ text { consumption}=\]

'



'

End Sub

Sub Macro21()

'

' Macro21 Macro
```

' 14.1. master derivatives : electrical derivatives for a simple electrical circuit with an induction ,\(L\) and a resistor \(R\/ the voltage across the inductance can be by : \ [V-L { L\ frac {Di}{St}\]

'

' "&chr(10)&"Where \(v-L)= voltage accross the inductor.

'

End Sub

Sub Macro22()

'

' Macro22 Macro

'   Eingenvalue analysis for a system represented by a matrix the eingenvalue can indicate stability ,if all aigenvalue have negative real part the involved finding a lyapunov ,(function \(V(x)\) , such that \(V(X)>0\) and ,,\(\dot{(V)(X)<O\) for stabilit

'

End Sub

Sub Macro23()

'

' Macro23 Macro

'   - r esponse request get ,(f" http:// API electricity meter comparable ,/ { meter _ I'd "} return response .jsob ( )

'

'

End Sub

Sub Macro25()

'

' Macro25 Macro

'   _1 force balance the net force acting on the system,express as \F-{\text { net }}=F-{\ text { pneumatic}}++ ,

' "&chr(10)&"

```
' "&chr(10)&"   F-{\text { hydraulic }}- , F {\ text { damping }}-F{\ text ( inertial }}
'


'
End Sub
Sub Macro26()
'
' Macro26 Macro
'   To derive the relationship force ,motion. ,power ,energy .
' "&chr(10)&"
' "&chr(10)&"   \[F= m\ CDOT a \ ] where.
' "&chr(10)&"
' "&chr(10)&"   .\(F\) = force ( N) , | \ ( m \)= mass ( kg ) |\(a)= acceleration ,( m/s.s)
'


'
End Sub
Sub Macro27()
'
' Macro27 Macro
'   Kinetic energy ,( k.E) is the energy of an object du it's motion .
' "&chr(10)&"
' "&chr(10)&"   \[K.E= \frac {I}{2}.m.V^2\..
' "&chr(10)&"
'


'
End Sub
Sub Macro28()
```

```
'

' Macro28 Macro

'   Example: Grades: [70,75,80,85,90][70, 75, 80, 85, 90], N=5N = 5:

' "&chr(10)&"   1. Mean:

' "&chr(10)&"

' "&chr(10)&"   μ=70+75+80+85+905=80.\mu = \frac{70 + 75 + 80 + 85 + 90}{5} = 80.

' "&chr(10)&"   2. Variance:

' "&chr(10)&"

' "&chr(10)&"   s2=(70-80)2+(75-80)2+(80-80)2+(85-80)2+(90-80)25=50.\sigma^2 = \frac{(70-80)^2 +
(75-80

'

End Sub

Sub Macro29()

'

' Macro29 Macro

' a) Energy in Capacitors

'



' "&chr(10)&"Formula: $$ E = \frac{1}{2} C V^2 $$ Where:

' "&chr(10)&"· CC: Capacitance (Farads),

' "&chr(10)&"· VV: Voltage (Volts).

'



' "&chr(10)&"Example: For a 10 µF10 \, \mu F capacitor with V=240VV = 240V: $$ E = \frac{1}{2} \times
10 \times 10^{-6} \times 240^2 = 0.288

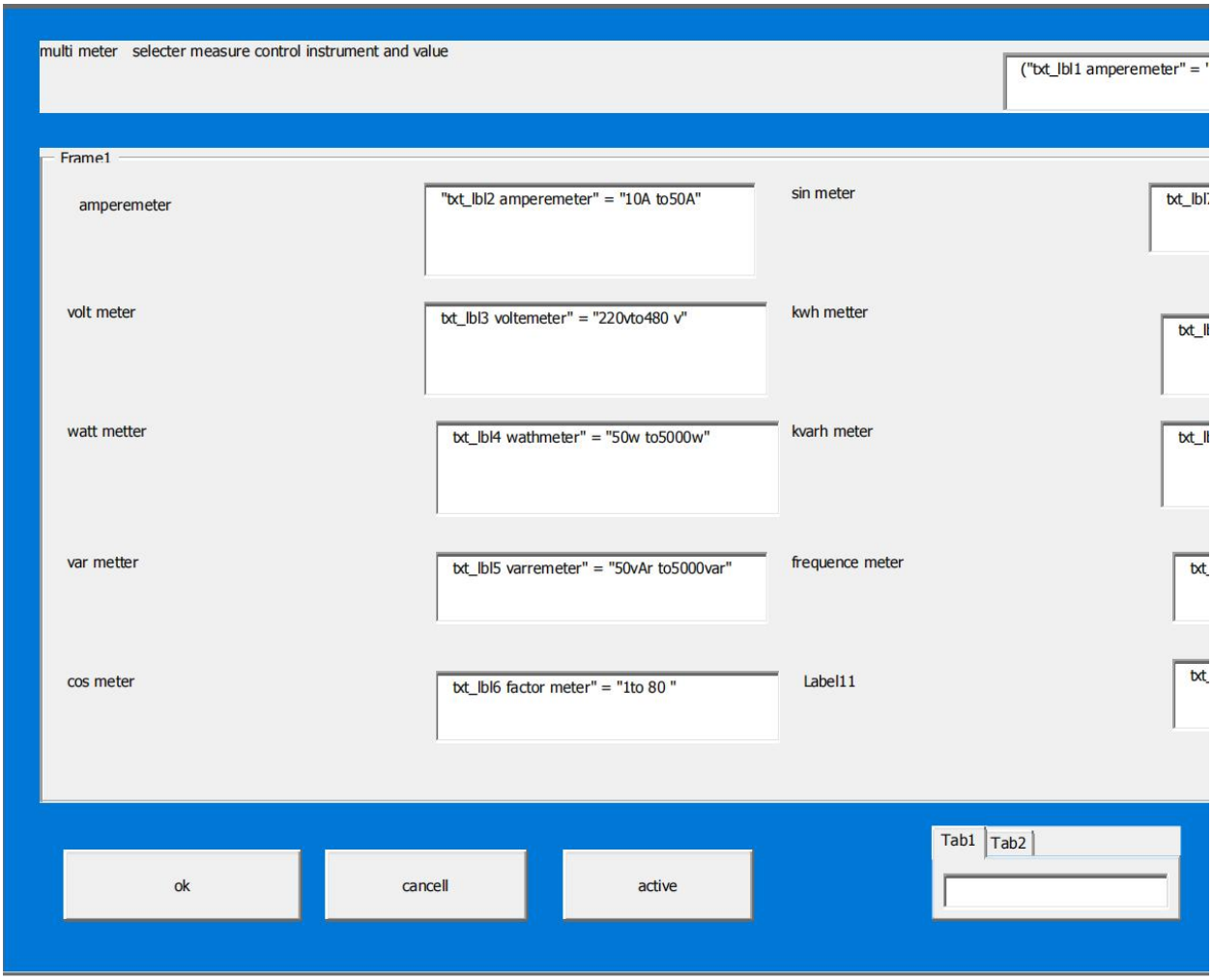
'

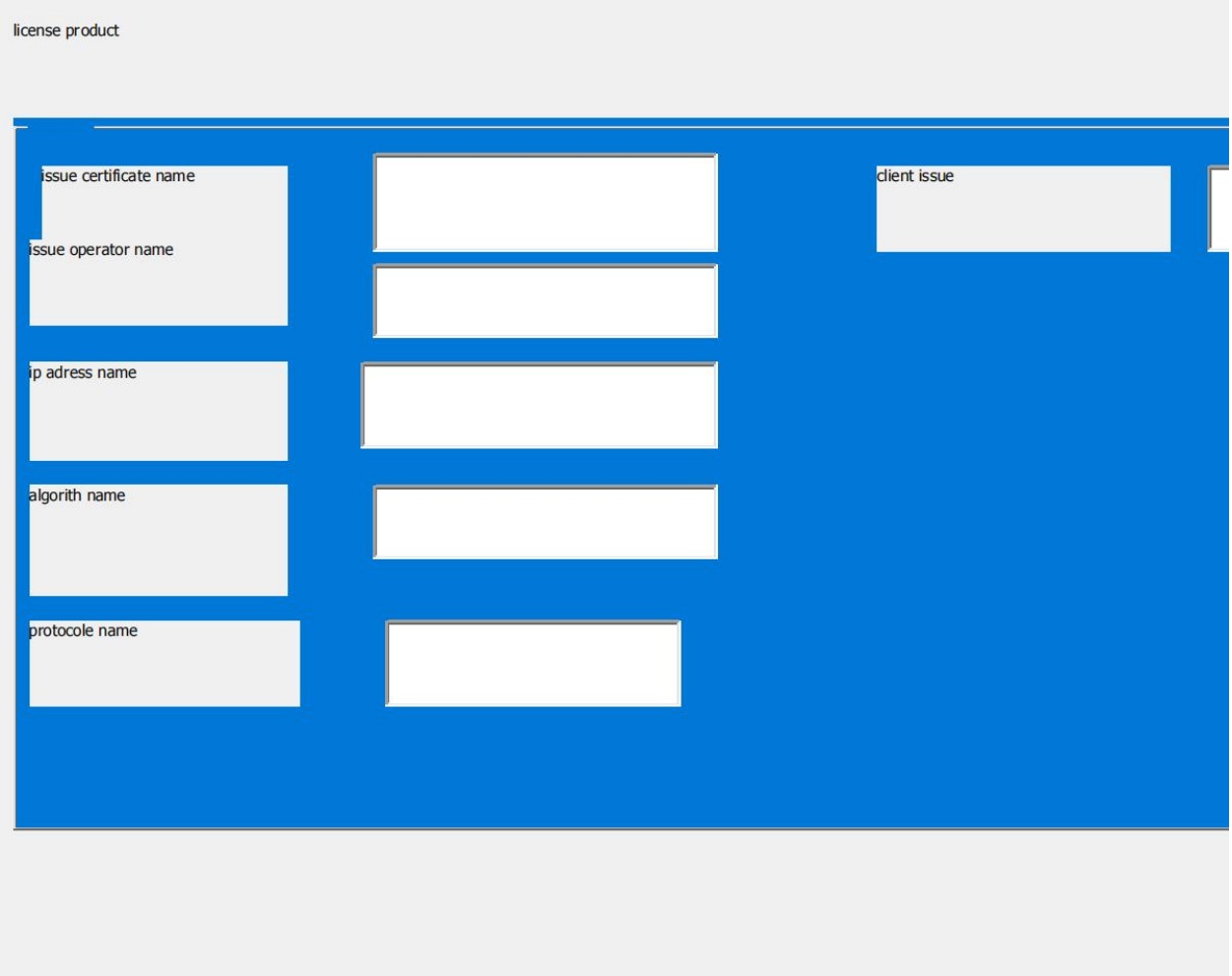
End Sub

Sub Macro30()

'
```

```
' Macro30 Macro
'
' "&chr(10)&"   B=?0Tc(t) dt,B = \int_0^T c(t) \, dt,
' "&chr(10)&"
' "&chr(10)&"   where c(t)c(t): cost rate over time tt.
' "&chr(10)&"
' "&chr(10)&"   Example: For c(t)=200-20tc(t) = 200 - 20t over [0,5][0, 5]:
' "&chr(10)&"   1. Compute:
' "&chr(10)&"
' "&chr(10)&"   \[ B = \int_0^5 (200 - 20t) \, dt = \left[200t - 10t2\right]_05. \]
' "&chr(10)&"   2. Result:
' "&chr(10)&"
'
End Sub
Sub Macro31()
'
' Macro31 Macro
'   For time-dependent power P(t)P(t), energy is: $$ E = \int_{t_1}^{t_2} P(t) \, dt $$. If P(t)=100sin?(2pt)P(t) = 100 \sin(2\pi t), calculate energy over t=0t = 0 to t=1st = 1s: $$ E = \int_0^1 100 \sin(2\pi t) \, dt = \left[-\frac{100}{2\pi} \cos(2\pi t)\
'
End Sub
```


multi meter selecter measure control instrument and value
("txt_lbl1 amperemeter" = '
Frame1
amperemeter
"txt_lbl2 amperemeter" = "10A to50A"
sin meter
volt meter
txt_lbl3 voltemeter" = "220vto480 v"
kwh metter
watt metter
txt_lbl4 wathmeter" = "50w to5000w"
kvarh meter
var metter
txt_lbl5 varremeter" = "50vAr to5000var"
frequence meter
cos meter
txt_lbl6 factor meter" = "1to 80 "
Label11
ok
cancell
active
Tab1
Tab2


license product
issue certificate name
issue operator name
ip adress name
algorith name
protocole name
client issue

frm13 - 1
```
Private Sub CommandButton1_Click()
End Sub
Private Sub Label1_Click()
End Sub
Private Sub Label12_Click()
End Sub
Private Sub Label13_Click()
End Sub
Private Sub Label3_Click()
End Sub
Private Sub Label4_Click()
End Sub
Private Sub Label5_Click()
End Sub
Private Sub Label7_Click()
End Sub
Private Sub Label8_Click()
End Sub
Private Sub Label9_Click()
End Sub
Private Sub ListBox1_Click()
End Sub
Private Sub ListBox2_Click()
End Sub
Private Sub MultiPage1_Change()
End Sub
Private Sub ScrollBar1_Change()
End Sub
Private Sub TextBox1_Change()
End Sub
Private Sub TextBox10_Change()
End Sub
Private Sub TextBox12_Change()
End Sub
Private Sub TextBox2_Change()
End Sub
Private Sub TextBox3_Change()frm13 - 2
End Sub
Private Sub TextBox4_Change()
End Sub
Private Sub TextBox6_Change()
End Sub
Private Sub TextBox8_Change()
End Sub
Private Sub TextBox9_Change()
End Sub
Private Sub ToggleButton1_AfterUpdate()
End Sub
Private Sub ToggleButton1_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean, ByVal Data As
MSForms.
DataObject, ByVal X As Single, ByVal Y As Single, ByVal DragState As MSForms.fmDragState, ByVal Effect
As MSForms.ReturnEffect, ByVal Shift As Integer)
End Sub
```

Private Sub ToggleButton1_BeforeUpdate(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub ToggleButton1_Change()
End Sub
Private Sub ToggleButton1_Click()
End Sub
Private Sub ToggleButton1_Enter()
End Sub
Private Sub ToggleButton1_Error(ByVal Number As Integer, ByVal Description As MSForms.ReturnString, By Val SCode As Long, ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, ByVal CancelDisplay As MSForms.ReturnBoolean)
End Sub
Private Sub ToggleButton1_KeyDown(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub ToggleButton1_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)
End Sub
Private Sub ToggleButton1_KeyUp(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub ToggleButton1_MouseMove(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single , ByVal Y As Single)
End Sub
Private Sub ToggleButton1_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal Y As Single)
End Subfrm13 - 3
Private Sub UserForm_Click()
End Submulti meter selecter measure control instrument and value
amperemeter
volt meter
watt metter
"txt_lbl2 amperemeter" = "10A to50A"
txt_lbl3 voltemeter" = "220vto480 v"
txt_lbl4 wathmeter" = "50w to5000w"
var metter
cos meter
txt_lbl5 varremeter" = "50vAr to5000var"
txt_lbl6 factor meter" = "1to 80 "
sin meter
kwh metter
kvarh meter
frequence meter
txt_lbl7 factmeter" = "1to60A"
txt_lbl8 amperemeter" = "100kw
txt_lbl9 vrhemeter" = "10A to50
txt_lbl10amperemeter" = "10A to5
Label11
txt_lbl11 amperemeter" = "10A to
Frame1
ok
cancell
active
("txt_lbl1 amperemeter" = "10A to50A") and (txt_lbl1 voltemeter" = "220vto480 v")and(txt_lbl1 wathmeter" = "50w to5000w")a(txt_lb
Tab1 Tab2

```
Sub Macro1()
'
' Macro1 Macro
' visual basic atm program .sten object by system .event )hand
' "&chr(10)&"public class transaction box
' "&chr(10)&"const service as decimal =6.5
' "&chr(10)&"const pin as integer +9343
' "&chr(10)&"dim balance as decimal =150
' "&chr(10)&"private sub label 12_click (by sender System.object event arg handles labe
'
End Sub
Sub Macro2()
'
' Macro2 Macro
' type meter three phase ac static watt hous smart
' "&chr(10)&"metering algorith
' "&chr(10)&"accuracy  nomial voltage  mettering frequence metering const functionality current sensors energy pulse energy temper detection remote communication iec 62056 extrevm internal battery
'
    ActiveWindow.ActivePane.VerticalPercentScrolled = 205
    ActiveWindow.ActivePane.VerticalPercentScrolled = 146
    Selection.TypeText Text:= _
        "-----------------------------------------------------------"
    Selection.TypeText Text:= _
        "-----------------------------------------------------------"
    Selection.TypeText Text:="-------"
    Selection.TypeParagraph
    Selection.PasteAndFormat (wdFormatOriginalFormatting)
```

```
ActiveWindow.ActivePane.VerticalPercentScrolled = 146
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
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Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.Paste
ActiveDocument.Save
ActiveWindow.ActivePane.VerticalPercentScrolled = 207
```

```
    ActiveWindow.ActivePane.VerticalPercentScrolled = 202
    ActiveWindow.ActivePane.VerticalPercentScrolled = 197
    ActiveWindow.ActivePane.LargeScroll Down:=1
    ActiveWindow.ActivePane.VerticalPercentScrolled = -75
    ActiveWindow.ActivePane.VerticalPercentScrolled = -41
    Windows("Doc8 drawing tshingombe fiston").Activate
    Windows("Doc2 drawing tshingombe").Activate
    ActiveWindow.ActivePane.VerticalPercentScrolled = 127
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ActiveWindow.Close
    ChangeFileOpenDirectory "C:\Users\Library SIX\Desktop\"
    ActiveDocument.SaveAs2 FileName:="Doc1 tshing.docx", FileFormat:= _
        wdFormatXMLDocument, LockComments:=False, Password:="", AddToRecentFiles _
        :=True, WritePassword:="", ReadOnlyRecommended:=False, EmbedTrueTypeFonts _
        :=False, SaveNativePictureFormat:=False, SaveFormsData:=False, _
        SaveAsAOCELetter:=False, CompatibilityMode:=15
    ActiveWindow.Close
    Application.Quit
End Sub
Sub Macro3()
'
' Macro3 Macro
' 170.{ “ IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=)THEN ”}  OR “SUB”_” CLICK”
' "&chr(10)&" “SELECT REGISTER .ELSE , CPU”=0 ,  ADRESSPIN = 000000000
' "&chr(10)&"180 END IF “ IF (S1=0)+(S2=0)+(S3=0)+(S4=0)+(S5=0)+(S6=0)+(S7=0)+(S8=0)THEN ”}  OR
“SUB”_” CLICK
```

```
' "&chr(10)&"EXECU
'
   Application.Run MacroName:="frm1"
End Sub
Sub Macro4()
'
' Macro4 Macro
' 170.{ “ IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=0)THEN ”}  OR “SUB”_” CLICK”
' "&chr(10)&" SELECT REGISTER .ELSE , CPU ,
' "&chr(10)&"180 END IF “ IF (S1=1)+(S2=1)+(S3=1)+(S4=1)+(S5=1)+(S6=1)+(S7=1)+(S8=1)THEN ”}  OR
“SUB”_” CLICK
' "&chr(10)&"EXECUTION LOOP
'


'
   Application.Run MacroName:="frm1"
   ActiveWindow.ActivePane.VerticalPercentScrolled = 119
   Selection.Copy
   Application.Run MacroName:="frm1"
End Sub
Sub Macro5()
'
' Macro5 Macro
' 10.INPUT X1
' "&chr(10)&"20. INPUT .X2
' "&chr(10)&"30. INPUT X3
' "&chr(10)&"40. INPUT X4
' "&chr(10)&"50,IN[UT X5
' "&chr(10)&"60. INPUT X6
```

```
' "&chr(10)&"60.INPUT .X7.
'


' "&chr(10)&" 70.OUTPUT  S1
' "&chr(10)&"80.OUTPUT.S2
' "&chr(10)&"90,OUTPUT S3
' "&chr(10)&"100.OUTPUT S4
' "&chr(10)&"110.OUTPUT S5
' "&chr(10)&"120 OUTPUT S6
' "&chr(10)&"130.OUTPUT S7
' "&chr(10)&"140.OUTPUT
' "&chr(10)&"150 SELECT REGISTER
' "&chr(10)&"150 OUTPUT HARDW
'
   Application.Run MacroName:="frm1"
End Sub
Sub frm1()
'
' frm1 Macro
'
'


End Sub
Sub Macro24()
'
' Macro24 Macro
'
' "&chr(10)&"   \(f(x,y)\) the partial derivatives with respect to \(x\)
' "&chr(10)&"
```

```
' "&chr(10)&"   Is denoted as \(\ frac{\ partial f }{ partial x}\) and with ,
' "&chr(10)&"
' "&chr(10)&"   Respect to \ ( y\) as \(\ frac {\ partial f }{\ partial ,y }\)
' "&chr(10)&"
' "&chr(10)&"   Examp : \[ funct \[ f( x,y)=x^2y+3xy^3\]
' "&chr(10)&"
' "&chr(10)&"   * Calcu
'
End Sub
Sub Macro6()
'
' Macro6 Macro
'
' "&chr(10)&"   \(f(x,y)\) the partial derivatives with respect to \(x\)
' "&chr(10)&"
' "&chr(10)&"   Is denoted as \(\ frac{\ partial f }{ partial x}\) and with ,
' "&chr(10)&"
' "&chr(10)&"   Respect to \ ( y\) as \(\ frac {\ partial f }{\ partial ,y }\)
' "&chr(10)&"
' "&chr(10)&"   Examp : \[ funct \[ f( x,y)=x^2y+3xy^3\]
' "&chr(10)&"
' "&chr(10)&"   * Calcu
'
End Sub
Sub Macro7()
'
' Macro7 Macro
'
```

```
' "&chr(10)&"   \( f(x,y)\), the total derivatives \ ( DF \) is given by : \[ DF = \ frac { \ partial f }{\ partial
x }sx +\ frac{ \ partial }{ \ partial y } St \ ]

' "&chr(10)&"

' "&chr(10)&"   Using the previous : \ [ DF = 2xy+ 2y^2)

' "&chr(10)&"

'



'

End Sub

Sub Macro8()

'

' Macro8 Macro

'   1. Fourier series : the Fourier series and cosine function for periodic function \ ( ft)\) with period ( t)
the Fourier series is.

' "&chr(10)&"

' "&chr(10)&"   f(t)= a 0+\ sum ${n= 1}{\ infty}

' "&chr(10)&"

' "&chr(10)&"   \ left + a_ n \ cos \ left \ left + } frac { 2\ pi not }{T}

' "&chr(10)&"

' "&chr(10)&"   \ right ) + b _

'

End Sub

Sub Macro9()

'

' Macro9 Macro

'

' "&chr(10)&"   .\[ R-{\ text t{ total }}= R1+R2+R3\]

' "&chr(10)&"

' "&chr(10)&"   . Substituting the values \[ R - { \ text { total }}= 10\.\ text , { ohms }+ 20\, text{ ohms}+30\,
text {ohms}\], calculating ,\[ R - { \ text { total /}} = 60\\ text { ohm }\]
```

```
'


'
End Sub
Sub Macro10()
'
' Macro10 Macro
' 0
' "&chr(10)&"   [ Z =\ sqrt{R^ 2+(x-L-X_C)^2}\]
' "&chr(10)&"
' "&chr(10)&"   Where _\(x_L= 2\ pi f L \ Pi .f.c\} ( capacitive reactance ,
' "&chr(10)&"
' "&chr(10)&"   -\(X_C)=\ frac ,{1}{2\ pi.f.c}\}( capacitive reactance.
' "&chr(10)&"
' "&chr(10)&"   -|(fI) is the frequency in Hertz ( z)
' "&chr(10)&"
' "&chr(10)&"   -\(L/) is the inductance  in Hertz ( Hz )
'
End Sub
Sub Macro11()
'
' Macro11 Macro
'   The power factor ,of is defined as the ratio of real power to apparent power , \ [ \ text power
factor ,of )}=\ frac ,{P}{s}\]
' "&chr(10)&"
' "&chr(10)&"   Where : .\(P\)= real power ( w)
' "&chr(10)&"
' "&chr(10)&"   .\(S\\)= apparent power ,( VA)
'
```

```
'

End Sub

Sub Macro12()

'

' Macro12 Macro

'   \[S=\sqt{P^2+Q^2}\]

' "&chr(10)&"

' "&chr(10)&"   .value .real power (\(P\))=500w,

' "&chr(10)&"

' "&chr(10)&"   .reactive power(\Q\))=300VAR

' "&chr(10)&"

' "&chr(10)&"   - calculate apparent power ( s)\[,S=\sqt{P^2t

'


'

End Sub

Sub Macro13()

'

' Macro13 Macro

'

' "&chr(10)&"   -where .

' "&chr(10)&"

' "&chr(10)&"   |(a-O=| frac {1}{T} int- 0^ f(t)\dt)

' "&chr(10)&"

' "&chr(10)&"   .\+a-n = frac {2}{T} int_O^Y f ( t) \ cos\ left ( \ frac { 2\ Pi .n t}{ t } rigth \, DT have simple square wave function.

'
```

```
'

End Sub

Sub Macro14()

'

' Macro14 Macro

'   - the Fourier transform is used to convert a time domain signal into it frequency domain represent formula : transform \ F ( \ omega )\( of a continuous signal \ ( f(t) , e^{- j \ omega }\ dt\]

' "&chr(10)&"

' "&chr(10)&"   - where . \( f+ \ omega )\) = Fourier transform of the

'

End Sub

Sub Macro15()

'

' Macro15 Macro

'   - the la place trans is another transformation used to analyse linear time _ invariant system formula for the la place transform \ F( S)\) of function \ ( f(t)\) is \[f(s)=\ into -{O} infty } ,  f( t ) ,, e{-st } St \]

' "&chr(10)&"

' "&chr(10)&"   - \( f( s)\)= Laplace transfor

'

End Sub

Sub Macro16()

'

' Macro16 Macro

'   \|[ | dot { x}(t}=Ax(t)+By(t)\]\[y(t)=(x(t)+du(t)\]

' "&chr(10)&"

' "&chr(10)&"   Where :

' "&chr(10)&"

' "&chr(10)&"   -|(x(t)\)= state vector

' "&chr(10)&"
```

```
' "&chr(10)&"   .|(u(t)\)= Input vector

' "&chr(10)&"

' "&chr(10)&"   .\ (y( t) \)= output vector .

' "&chr(10)&"

' "&chr(10)&"   .(A\)= System .

' "&chr(10)&"

' "&chr(10)&"   .\(B\)= input matrix .

' "&chr(10)&"

' "&chr(10)&"   .|(C\) = Output matrix .

' "&chr(10)&"

' "&chr(10)&"   .\( D \ )

'

End Sub

Sub Macro17()

'

' Macro17 Macro

'   1. DC machines : speed ( n ) the speed of DC motor can be calculated using formula \[N=\ frac { V-1\
CDOT -R}{ CDOT \ Phi }\]

' "&chr(10)&"

' "&chr(10)&"   - where \ ( N\ ) = speed in Rpm ( revolution perminute .

' "&chr(10)&"

' "&chr(10)&"   - \ ( N\)= supply voltage ( v ) ,

' "&chr(10)&"

' "&chr(10)&"   -\(i\)= armature curr

'

End Sub

Sub Macro18()

'

' Macro18 Macro
```

```
'   14*. Mass balance equation : the general mass balance equation can expressed as :

' "&chr(10)&"

' "&chr(10)&"   \[\ text { input }-\ text { output }+\ { generation } \ text  consumption}=\ text
{ accumulation \ ]

' "&chr(10)&"

'



'

End Sub

Sub Macro19()

'

' Macro19 Macro

'   - for a steady state process ( where accumulation is zero the equation simplified to \[\ text { input}\
text { output}\tezt Generation}-\ text { consumption}=\]

'



'

End Sub

Sub Macro20()

'

' Macro20 Macro

'   - for a steady state process ( where accumulation is zero the equation simplified to \[\ text { input}\
text { output}\tezt Generation}-\ text { consumption}=\]

'



'

End Sub

Sub Macro21()

'

' Macro21 Macro
```

' 14.1. master derivatives : electrical derivatives for a simple electrical circuit with an induction ,\(L\) and a resistor \(R\/ the voltage across the inductance can be by : \ [V-L { L\ frac {Di}{St}\]

'

' "&chr(10)&"Where \(v-L)= voltage accross the inductor.

'

End Sub

Sub Macro22()

'

' Macro22 Macro

'   Eingenvalue analysis for a system represented by a matrix the eingenvalue can indicate stability ,if all aigenvalue have negative real part the involved finding a lyapunov ,(function \(V(x)\) , such that \(V(X)>0\) and ,,\(\dot{(V)(X)<O\) for stabilit

'

End Sub

Sub Macro23()

'

' Macro23 Macro

'   - r esponse request get ,(f" http:// API electricity meter comparable ,/ { meter _ I'd "} return response .jsob ( )

'

'

End Sub

Sub Macro25()

'

' Macro25 Macro

'   _1 force balance the net force acting on the system,express as \F-{\text { net }}=F-{\ text { pneumatic}}++ ,

' "&chr(10)&"

```
' "&chr(10)&"   F-{\text { hydraulic }}- , F {\ text { damping }}-F{\ text ( inertial }}
'


'
End Sub
Sub Macro26()
'
' Macro26 Macro
'   To derive the relationship force ,motion. ,power ,energy .
' "&chr(10)&"
' "&chr(10)&"   \[F= m\ CDOT a \ ] where.
' "&chr(10)&"
' "&chr(10)&"   .\(F\) = force ( N) , | \ ( m \)= mass ( kg ) |\(a)= acceleration ,( m/s.s)
'


'
End Sub
Sub Macro27()
'
' Macro27 Macro
'   Kinetic energy ,( k.E) is the energy of an object du it's motion .
' "&chr(10)&"
' "&chr(10)&"   \[K.E= \frac {I}{2}.m.V^2\..
' "&chr(10)&"
'


'
End Sub
Sub Macro28()
```

```
'

' Macro28 Macro

'   Example: Grades: [70,75,80,85,90][70, 75, 80, 85, 90], N=5N = 5:

' "&chr(10)&"   1. Mean:

' "&chr(10)&"

' "&chr(10)&"   μ=70+75+80+85+905=80.\mu = \frac{70 + 75 + 80 + 85 + 90}{5} = 80.

' "&chr(10)&"   2. Variance:

' "&chr(10)&"

' "&chr(10)&"   s2=(70-80)2+(75-80)2+(80-80)2+(85-80)2+(90-80)25=50.\sigma^2 = \frac{(70-80)^2 +
(75-80

'

End Sub

Sub Macro29()

'

' Macro29 Macro

' a) Energy in Capacitors

'


' "&chr(10)&"Formula: $$ E = \frac{1}{2} C V^2 $$ Where:

' "&chr(10)&"· CC: Capacitance (Farads),

' "&chr(10)&"· VV: Voltage (Volts).

'


' "&chr(10)&"Example: For a 10 µF10 \, \mu F capacitor with V=240VV = 240V: $$ E = \frac{1}{2} \times
10 \times 10^{-6} \times 240^2 = 0.288

'

End Sub

Sub Macro30()

'
```

```
' Macro30 Macro
'
' "&chr(10)&"   B=?0Tc(t) dt,B = \int_0^T c(t) \, dt,
' "&chr(10)&"
' "&chr(10)&"   where c(t)c(t): cost rate over time tt.
' "&chr(10)&"
' "&chr(10)&"   Example: For c(t)=200-20tc(t) = 200 - 20t over [0,5][0, 5]:
' "&chr(10)&"   1. Compute:
' "&chr(10)&"
' "&chr(10)&"   \[ B = \int_0^5 (200 - 20t) \, dt = \left[200t - 10t2\right]_05. \]
' "&chr(10)&"   2. Result:
' "&chr(10)&"
'
End Sub
Sub Macro31()
'
' Macro31 Macro
'   For time-dependent power P(t)P(t), energy is: $$ E = \int_{t_1}^{t_2} P(t) \, dt $$. If P(t)=100sin?(2pt)P(t) = 100 \sin(2\pi t), calculate energy over t=0t = 0 to t=1st = 1s: $$ E = \int_0^1 100 \sin(2\pi t) \, dt = \left[-\frac{100}{2\pi} \cos(2\pi t)\
'
End Sub
```

```
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm12
   Caption         =   "UserForm12"
   ClientHeight    =   8736
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   19764
   OleObjectBlob   =   "UserForm computer x 1 tshingombe.frx":0000
   StartUpPosition =   1  'CenterOwner
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm12"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm12
   Caption         =   "UserForm12"
   ClientHeight    =   9132
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   20004
   OleObjectBlob   =   "UserForm1 tshingombe student registration excll vb
macro.frx 23.frx COMPUTER  X MACRO 14.frx":0000
   StartUpPosition =   1  'CenterOwner
End
Attribute VB_Name = "UserForm12"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
Private Sub Label5_Click()

End Sub

Private Sub Label6_Click()

End Sub

Private Sub CommandButton5_Click()

End Sub

Private Sub CommandButton6_Click()

End Sub

Private Sub CommandButton8_Click()

End Sub

Private Sub CommandButton9_Click()
```

```
End Sub

Private Sub Label1_Click()

End Sub

Private Sub Label2_Click()

End Sub

Private Sub Label3_Click()

End Sub

Private Sub Label5_Click()

End Sub

Private Sub ListBox1_Click()

End Sub

Private Sub ScrollBar1_Change()

End Sub

Private Sub UserForm_Activate()

End Sub

Private Sub UserForm_Click()

End Sub
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm9
   Caption         =   "UserForm9"
   ClientHeight    =   8820
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   19656
   OleObjectBlob   =   "UserForm2tshingombe.metering   algo.frx":0000
   StartUpPosition =   1  'CenterOwner
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm9"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
Private Sub Frame3_Click()

End Sub

Private Sub TextBox6_Change()

End Sub
```

```
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm1
   Caption         =   "UserForm1"
   ClientHeight    =   9024
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   19812
   OleObjectBlob   =   "EXCELL UserForm1TSHIN.frm FORM.pdf MATERIAL
INSTALLER.pdf 2 CALCULAR HARDWARE.pdf, POWER  ...frx":0000
   StartUpPosition =   3  'Windows Default
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm1"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm3
   Caption         =   "UserForm3"
   ClientHeight    =   8868
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   19944
   OleObjectBlob   =   "FORM TSHINGOMBE..TSHI PLC.frm 2.frx":0000
   StartUpPosition =   1  'CenterOwner
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm3"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
Private Sub Label4_Click()

End Sub

Private Sub Label5_Click()

End Sub

Private Sub TextBox1_Change()

End Sub

Private Sub UserForm_Click()

End Sub
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm2
   Caption         =   "UserForm2"
   ClientHeight    =   8640
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   19632
```

```
   OleObjectBlob   =   "EXCELL UserForm1TSHIN.frm FORM.pdf MATERIAL
INSTALLER.pdf 2 CALCULAR excell , vb.frx":0000
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm2"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
Private Sub CommandButton13_Click()

End Sub

Private Sub CommandButton17_Click()

End Sub

Private Sub CommandButton3_Click()

End Sub

Private Sub CommandButton7_Click()

End Sub

Private Sub Label1_Click()

End Sub

Private Sub TextBox1_Change()

End Sub

Private Sub TextBox1_DblClick(ByVal Cancel As MSForms.ReturnBoolean)

End Sub
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm3
   Caption         =   "UserForm3"
   ClientHeight    =   8868
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   19944
   OleObjectBlob   =   "FORM TSHINGOMBE..TSHI PLC.frm 2.frx":0000
   StartUpPosition =   1  'CenterOwner
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm3"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
Private Sub Label4_Click()

End Sub
```

```
Private Sub Label5_Click()

End Sub

Private Sub TextBox1_Change()

End Sub

Private Sub UserForm_Click()

End Sub
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm2
   Caption         =   "UserForm2"
   ClientHeight    =   8640
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   19632
   OleObjectBlob   =   "EXCELL UserForm1TSHIN.frm FORM.pdf MATERIAL
INSTALLER.pdf 2 CALCULAR excell , vb.frx":0000
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm2"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
Private Sub CommandButton13_Click()

End Sub

Private Sub CommandButton17_Click()

End Sub

Private Sub CommandButton3_Click()

End Sub

Private Sub CommandButton7_Click()

End Sub

Private Sub Label1_Click()

End Sub

Private Sub TextBox1_Change()

End Sub

Private Sub TextBox1_DblClick(ByVal Cancel As MSForms.ReturnBoolean)

End Sub
VERSION 5.00
```

```
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm1
   Caption         =   "UserForm1"
   ClientHeight    =   9300
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   19992
   OleObjectBlob   =   "UserForm1 tshingombe student registration excll vb
macro.frx 23.frx":0000
   StartUpPosition =   1  'CenterOwner
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm1"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
Private Sub Label9_Click()

End Sub

Private Sub OptionButton1_Click()

End Sub

Private Sub OptionButton2_Click()

End Sub

Private Sub TextBox1_Change()

End Sub

Private Sub TextBox2_Change()

End Sub

Private Sub TextBox3_Change()

End Sub

Private Sub TextBox4_Change()

End Sub

Private Sub TextBox6_Change()

End Sub

Private Sub TextBox7_Change()

End Sub

Private Sub TextBox8_Change()

End Sub
```

```
Private Sub UserForm_Click()

End Sub

Private Sub UserForm_DblClick(ByVal Cancel As MSForms.ReturnBoolean)

End Sub

Private Sub UserForm_Initialize()

End Sub
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm8
   Caption         =   "UserForm8"
   ClientHeight    =   9204
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   19908
   OleObjectBlob   =   "UserForm2tshingombe.account teller student.frx":0000
   StartUpPosition =   1  'CenterOwner
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm8"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
Private Sub Frame1_Click()

End Sub

Private Sub Frame3_Click()

End Sub

Private Sub Frame5_Click()

End Sub

Private Sub Label13_Click()

End Sub

Private Sub Label14_Click()

End Sub

Private Sub Label5_Click()

End Sub

Private Sub TextBox11_Change()

End Sub
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm2
   Caption         =   "UserForm2"
```

```
   ClientHeight    =   7236
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   17748
   OleObjectBlob   =   "TSHINGOMBE EXCELLL  CALCULATOR,,  UserForm2.frx":0000
   StartUpPosition =   1  'CenterOwner
End
Attribute VB_Name = "UserForm2"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
Private Sub CommandButton69_Click()

End Sub

Private Sub CommandButton7_Click()

End Sub

Private Sub CommandButton70_Click()

End Sub

Private Sub CommandButton8_Click()

End Sub

Private Sub CommandButton9_Click()

End Sub

Private Sub Frame1_Click()

End Sub

Private Sub Frame2_Click()

End Sub

Private Sub Frame3_Click()

End Sub

Private Sub Label1_Click()

End Sub

Private Sub TextBox1_Change()

End Sub

Private Sub TextBox2_Change()

End Sub

Private Sub UserForm_Click()
```

```
End Sub
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm1
   Caption         =   "UserForm1"
   ClientHeight    =   9396
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   19560
   OleObjectBlob   =   "FORM TSHINGOMBE..TSHI PLC.frx":0000
   StartUpPosition =   1  'CenterOwner
End
Attribute VB_Name = "UserForm1"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
```

Sub Macro1()

'

' Macro1 Macro

' visual basic atm program .sten object by system .event)hand

' "&chr(10)&"public class transaction box

' "&chr(10)&"const service as decimal =6.5

' "&chr(10)&"const pin as integer +9343

' "&chr(10)&"dim balance as decimal =150

' "&chr(10)&"private sub label 12_click (by sender System.object event arg handles labe

'

End Sub

Sub Macro2()

'

' Macro2 Macro

' type meter three phase ac static watt hous smart

' "&chr(10)&"metering algorith

' "&chr(10)&"accuracy nomial voltage mettering frequence metering const functionality current sensors energy pulse energy temper detection remote communication iec 62056 extrevm internal battery

'

ActiveWindow.ActivePane.VerticalPercentScrolled = 205

```
ActiveWindow.ActivePane.VerticalPercentScrolled = 146
Selection.TypeText Text:= _
    "-----------------------------------------------------------"
Selection.TypeText Text:= _
    "-----------------------------------------------------------"
Selection.TypeText Text:="-------"
Selection.TypeParagraph
Selection.PasteAndFormat (wdFormatOriginalFormatting)
ActiveWindow.ActivePane.VerticalPercentScrolled = 146
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
```

```
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.TypeParagraph
Selection.Paste
ActiveDocument.Save
ActiveWindow.ActivePane.VerticalPercentScrolled = 207
ActiveWindow.ActivePane.VerticalPercentScrolled = 202
ActiveWindow.ActivePane.VerticalPercentScrolled = 197
ActiveWindow.ActivePane.LargeScroll Down:=1
ActiveWindow.ActivePane.VerticalPercentScrolled = -75
ActiveWindow.ActivePane.VerticalPercentScrolled = -41
Windows("Doc8 drawing tshingombe fiston").Activate
Windows("Doc2 drawing tshingombe").Activate
ActiveWindow.ActivePane.VerticalPercentScrolled = 127
ActiveWindow.Close
ActiveWindow.Close
ActiveWindow.Close
ActiveWindow.Close
ActiveWindow.Close
ChangeFileOpenDirectory "C:\Users\Library SIX\Desktop\"
ActiveDocument.SaveAs2 FileName:="Doc1 tshing.docx", FileFormat:= _
    wdFormatXMLDocument, LockComments:=False, Password:="", AddToRecentFiles _
    :=True, WritePassword:="", ReadOnlyRecommended:=False, EmbedTrueTypeFonts _
    :=False, SaveNativePictureFormat:=False, SaveFormsData:=False, _
    SaveAsAOCELetter:=False, CompatibilityMode:=15
ActiveWindow.Close
Application.Quit
```

```
End Sub
Sub Macro3()
'
' Macro3 Macro
' 170.{ “ IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=)THEN ”}  OR “SUB”_” CLICK”
' "&chr(10)&" “SELECT REGISTER .ELSE , CPU”=0 ,  ADRESSPIN = 000000000
' "&chr(10)&"180 END IF “ IF (S1=0)+(S2=0)+(S3=0)+(S4=0)+(S5=0)+(S6=0)+(S7=0)+(S8=0)THEN ”}  OR “SUB”_” CLICK
' "&chr(10)&"EXECU
'
    Application.Run MacroName:="frm1"
End Sub
Sub Macro4()
'
' Macro4 Macro
' 170.{ “ IF (X1=0)+(X2=0)+(X3=0)+(X4=0)+(X5=0)+(X6=0)+(X7=0)+(X8=0)THEN ”}  OR “SUB”_” CLICK”
' "&chr(10)&" SELECT REGISTER .ELSE , CPU ,
' "&chr(10)&"180 END IF “ IF (S1=1)+(S2=1)+(S3=1)+(S4=1)+(S5=1)+(S6=1)+(S7=1)+(S8=1)THEN ”}  OR “SUB”_” CLICK
' "&chr(10)&"EXECUTION LOOP
'


'
    Application.Run MacroName:="frm1"
    ActiveWindow.ActivePane.VerticalPercentScrolled = 119
    Selection.Copy
    Application.Run MacroName:="frm1"
End Sub
Sub Macro5()
```

```
'
' Macro5 Macro
' 10.INPUT X1
' "&chr(10)&"20. INPUT .X2
' "&chr(10)&"30. INPUT X3
' "&chr(10)&"40. INPUT X4
' "&chr(10)&"50,IN[UT X5
' "&chr(10)&"60. INPUT X6
' "&chr(10)&"60.INPUT .X7.
'

' "&chr(10)&" 70.OUTPUT  S1
' "&chr(10)&"80.OUTPUT.S2
' "&chr(10)&"90,OUTPUT S3
' "&chr(10)&"100.OUTPUT S4
' "&chr(10)&"110.OUTPUT S5
' "&chr(10)&"120 OUTPUT S6
' "&chr(10)&"130.OUTPUT S7
' "&chr(10)&"140.OUTPUT
' "&chr(10)&"150 SELECT REGISTER
' "&chr(10)&"150 OUTPUT HARDW
'
   Application.Run MacroName:="frm1"
End Sub
Sub frm1()
'
' frm1 Macro
'
'
```

```
End Sub
Sub Macro24()
'
' Macro24 Macro
'
' "&chr(10)&"   \(f(x,y)\) the partial derivatives with respect to \(x\)
' "&chr(10)&"
' "&chr(10)&"   Is denoted as \(\ frac{\ partial f }{ partial x}\) and with ,
' "&chr(10)&"
' "&chr(10)&"   Respect to \ ( y\) as \(\ frac {\ partial f }{\ partial ,y }\)
' "&chr(10)&"
' "&chr(10)&"   Examp : \[ funct \[ f( x,y)=x^2y+3xy^3\]
' "&chr(10)&"
' "&chr(10)&"   * Calcu
'
End Sub
Sub Macro6()
'
' Macro6 Macro
'
' "&chr(10)&"   \(f(x,y)\) the partial derivatives with respect to \(x\)
' "&chr(10)&"
' "&chr(10)&"   Is denoted as \(\ frac{\ partial f }{ partial x}\) and with ,
' "&chr(10)&"
' "&chr(10)&"   Respect to \ ( y\) as \(\ frac {\ partial f }{\ partial ,y }\)
' "&chr(10)&"
' "&chr(10)&"   Examp : \[ funct \[ f( x,y)=x^2y+3xy^3\]
' "&chr(10)&"
```

```
' "&chr(10)&"   * Calcu
'
End Sub
Sub Macro7()
'
' Macro7 Macro
'
' "&chr(10)&"   \( f(x,y)\), the total derivatives \ ( DF \) is given by : \[ DF = \ frac { \ partial f }{\ partial x }sx +\ frac{ \ partial }{ \ partial y } St \ ]
' "&chr(10)&"
' "&chr(10)&"   Using the previous : \ [ DF = 2xy+ 2y^2)
' "&chr(10)&"
'


'
End Sub
Sub Macro8()
'
' Macro8 Macro
'   1. Fourier series : the Fourier series and cosine function for periodic function \ ( ft)\) with period ( t) the Fourier series is.
' "&chr(10)&"
' "&chr(10)&"   f(t)= a 0+\ sum ${n= 1}{\ infty}
' "&chr(10)&"
' "&chr(10)&"   \ left + a_ n \ cos \ left \ left + } frac { 2\ pi not }{T}
' "&chr(10)&"
' "&chr(10)&"   \ right ) + b _
'
End Sub
```

```
Sub Macro9()
'
' Macro9 Macro
'
' "&chr(10)&"   .\[ R-{\ text t{ total }}= R1+R2+R3\]
' "&chr(10)&"
' "&chr(10)&"   . Substituting the values \[ R - { \ text { total }}= 10\.\ text , { ohms }+ 20\, text{ ohms}+30\, text {ohms}\], calculating ,\[ R - { \ text { total /}} = 60\\ text { ohm }\]
'


'
End Sub
Sub Macro10()
'
' Macro10 Macro
' 0
' "&chr(10)&"   [ Z =\ sqrt{R^ 2+(x-L-X_C)^2}\]
' "&chr(10)&"
' "&chr(10)&"   Where _\(x_L= 2\ pi f L \ Pi .f.c\} ( capacitive reactance ,
' "&chr(10)&"
' "&chr(10)&"   -\(X_C)=\ frac ,{1}{2\ pi.f.c}\}( capacitive reactance.
' "&chr(10)&"
' "&chr(10)&"   -|(fI) is the frequency in Hertz ( z)
' "&chr(10)&"
' "&chr(10)&"   -\(L/) is the inductance  in Hertz ( Hz )
'
End Sub
Sub Macro11()
'
```

```
' Macro11 Macro

'   The power factor ,of is defined as the ratio of real power to apparent power , \ [ \ text power
factor ,of )}=\ frac ,{P}{s}\]

' "&chr(10)&"

' "&chr(10)&"   Where : .\(P\)= real power ( w)

' "&chr(10)&"

' "&chr(10)&"   .\(S\\)= apparent power ,( VA)

'



'

End Sub

Sub Macro12()

'

' Macro12 Macro

'   \[S=\sqt{P^2+Q^2}\]

' "&chr(10)&"

' "&chr(10)&"   .value .real power (\(P\))=500w,

' "&chr(10)&"

' "&chr(10)&"   .reactive power(\Q\))=300VAR

' "&chr(10)&"

' "&chr(10)&"   - calculate apparent power ( s)\[,S=\sqt{P^2t

'



'

End Sub

Sub Macro13()

'

' Macro13 Macro

'
```

' "&chr(10)&" -where .

' "&chr(10)&"

' "&chr(10)&" |(a-O=| frac {1}{T} int- 0^ f(t)\dt)

' "&chr(10)&"

' "&chr(10)&" .\+a-n = frac {2}{T} int_O^Y f (t) \ cos\ left (\ frac { 2\ Pi .n t}{ t } rigth \, DT have simple square wave function.

'

'

End Sub

Sub Macro14()

'

' Macro14 Macro

' - the Fourier transform is used to convert a time domain signal into it frequency domain represent formula : transform \ F (\ omega)\(of a continuous signal \ (f(t) , e^{- j \ omega }\ dt\]

' "&chr(10)&"

' "&chr(10)&" - where . \(f+ \ omega)\) = Fourier transform of the

'

End Sub

Sub Macro15()

'

' Macro15 Macro

' - the la place trans is another transformation used to analyse linear time _ invariant system formula for the la place transform \ F(S)\) of function \ (f(t)\) is \[f(s)=\ into -{O} infty } , f(t) ,, e{-st } St \]

' "&chr(10)&"

' "&chr(10)&" - \(f(s)\)= Laplace transfor

'

End Sub

Sub Macro16()

'

```
' Macro16 Macro
'   \|[ | dot { x}(t}=Ax(t)+By(t)\]\[y(t)=(x(t)+du(t)\]
' "&chr(10)&"
' "&chr(10)&"   Where :
' "&chr(10)&"
' "&chr(10)&"   -|(x(t)\)= state vector
' "&chr(10)&"
' "&chr(10)&"   .|(u(t)\)= Input vector
' "&chr(10)&"
' "&chr(10)&"   .\ (y( t) \)= output vector .
' "&chr(10)&"
' "&chr(10)&"   .(A\)= System .
' "&chr(10)&"
' "&chr(10)&"   .\(B\)= input matrix .
' "&chr(10)&"
' "&chr(10)&"   .|(C\) = Output matrix .
' "&chr(10)&"
' "&chr(10)&"   .\( D \ )
'
End Sub
Sub Macro17()
'
' Macro17 Macro
'   1. DC machines : speed ( n ) the speed of DC motor can be calculated using formula \[N=\ frac { V-1\
CDOT -R}{ CDOT \ Phi }\]
' "&chr(10)&"
' "&chr(10)&"   - where \ ( N\ ) = speed in Rpm ( revolution perminute .
' "&chr(10)&"
' "&chr(10)&"   - \ ( N\)= supply voltage ( v ) ,
```

```
' "&chr(10)&"
' "&chr(10)&"   -\(i\)= armature curr
'
End Sub
Sub Macro18()
'
' Macro18 Macro
'   14*. Mass balance equation : the general mass balance equation can expressed as :
' "&chr(10)&"
' "&chr(10)&"   \[\ text { input }-\ text { output }+\ { generation } \ text  consumption}=\ text
{ accumulation \ ]
' "&chr(10)&"
'



'
End Sub
Sub Macro19()
'
' Macro19 Macro
'   - for a steady state process ( where accumulation is zero the equation simplified to \[\ text { input}\
text { output}\tezt Generation}-\ text { consumption}=\]
'



'
End Sub
Sub Macro20()
'
' Macro20 Macro
'   - for a steady state process ( where accumulation is zero the equation simplified to \[\ text { input}\
text { output}\tezt Generation}-\ text { consumption}=\]
```

'

'

End Sub

Sub Macro21()

'

' Macro21 Macro

' 14.1. master derivatives : electrical derivatives for a simple electrical circuit with an induction ,\(L\) and a resistor \(R\/ the voltage across the inductance can be by : \ [V-L { L\ frac {Di}{St}\]

'

' "&chr(10)&"Where \(v-L)= voltage accross the inductor.

'

End Sub

Sub Macro22()

'

' Macro22 Macro

'   Eingenvalue analysis for a system represented by a matrix the eingenvalue can indicate stability ,if all aigenvalue have negative real part the involved finding a lyapunov ,(function \(V(x)\) , such that \(V(X)>0\) and ,,\(\dot{(V)(X)<O\) for stabilit

'

End Sub

Sub Macro23()

'

' Macro23 Macro

'   - r esponse request get ,(f" http:// API electricity meter comparable ,/ { meter _ I'd "} return response .jsob ( )

'

'

```
End Sub

Sub Macro25()

'

' Macro25 Macro

'   _1 force balance the net force acting on the system,express as \F-{\text { net }}=F-{\ text
{ pneumatic}}++ ,

' "&chr(10)&"

' "&chr(10)&"   F-{\text { hydraulic }}- , F {\ text { damping }}-F{\ text ( inertial }}

'



'

End Sub

Sub Macro26()

'

' Macro26 Macro

'   To derive the relationship force ,motion. ,power ,energy .

' "&chr(10)&"

' "&chr(10)&"   \[F= m\ CDOT a \ ] where.

' "&chr(10)&"

' "&chr(10)&"   .\(F\) = force ( N) , | \ ( m \)= mass ( kg ) |\(a)= acceleration ,( m/s.s)

'



'

End Sub

Sub Macro27()

'

' Macro27 Macro

'   Kinetic energy ,( k.E) is the energy of an object du it's motion .

' "&chr(10)&"
```

```
' "&chr(10)&"   \[K.E= \frac {I}{2}.m.V^2\..
' "&chr(10)&"
'


'
End Sub
Sub Macro28()
'
' Macro28 Macro
'   Example: Grades: [70,75,80,85,90][70, 75, 80, 85, 90], N=5N = 5:
' "&chr(10)&"   1. Mean:
' "&chr(10)&"
' "&chr(10)&"   μ=70+75+80+85+905=80.\mu = \frac{70 + 75 + 80 + 85 + 90}{5} = 80.
' "&chr(10)&"   2. Variance:
' "&chr(10)&"
' "&chr(10)&"   s2=(70-80)2+(75-80)2+(80-80)2+(85-80)2+(90-80)25=50.\sigma^2 = \frac{(70-80)^2 +
(75-80
'
End Sub
Sub Macro29()
'
' Macro29 Macro
' a) Energy in Capacitors
'


' "&chr(10)&"Formula: $$ E = \frac{1}{2} C V^2 $$ Where:
' "&chr(10)&"· CC: Capacitance (Farads),
' "&chr(10)&"· VV: Voltage (Volts).
'
```

```
' "&chr(10)&"Example: For a 10 µF10 \, \mu F capacitor with V=240VV = 240V: $$ E = \frac{1}{2} \times 10 \times 10^{-6} \times 240^2 = 0.288
'
End Sub
Sub Macro30()
'
' Macro30 Macro
'
' "&chr(10)&"   B=?0Tc(t) dt,B = \int_0^T c(t) \, dt,
' "&chr(10)&"
' "&chr(10)&"   where c(t)c(t): cost rate over time tt.
' "&chr(10)&"
' "&chr(10)&"   Example: For c(t)=200-20tc(t) = 200 - 20t over [0,5][0, 5]:
' "&chr(10)&"   1. Compute:
' "&chr(10)&"
' "&chr(10)&"   \[ B = \int_0^5 (200 - 20t) \, dt = \left[200t - 10t2\right]_05. \]
' "&chr(10)&"   2. Result:
' "&chr(10)&"
'
End Sub
Sub Macro31()
'
' Macro31 Macro
'   For time-dependent power P(t)P(t), energy is: $$ E = \int_{t_1}^{t_2} P(t) \, dt $$. If P(t)=100sin?(2pt)P(t) = 100 \sin(2\pi t), calculate energy over t=0t = 0 to t=1st = 1s: $$ E = \int_0^1 100 \sin(2\pi t) \, dt = \left[-\frac{100}{2\pi} \cos(2\pi t)\
'
End Sub
Sub Macro32()
```

```
'
' Macro32 Macro
' 5. Predictive Analytics for Crime Prevention
' "&chr(10)&"Using linear regression to predict crime patterns:
' "&chr(10)&"
' "&chr(10)&"y=mx+b,y = mx + b,
' "&chr(10)&"where:
' "&chr(10)&"· yy: Predicted crime rate,
'
End Sub
Sub Macro33()
'
' Macro33 Macro
' Example: If m=0.02 crimes/personm = 0.02 \, \text{crimes/person}, b=10b = 10:
' "&chr(10)&"1. For x=1000x = 1000:
' "&chr(10)&"
' "&chr(10)&"y=0.02·1000+10=30 crimes.y = 0.02 \cdot 1000 + 10 = 30 \, \text{crimes}.
'


'
End Sub
Sub Macro34()
'
' Macro34 Macro
' Applications in Crime Resolution and Prevention
' "&chr(10)&"1. Forensic Investigations:
' "&chr(10)&"o Use ballistic and decay models to reconstruct crime scenes.
' "&chr(10)&"2. Crime Scene Management:
' "&chr(10)&"o Employ area estimation to secure and document crime perimeters.
```

```
' "&chr(10)&"3. Predictive
'
End Sub
Sub Macro35()
'
' Macro35 Macro
' 1. Evidence Decay Over Time Using Exponential Models
' "&chr(10)&"Physical evidence, such as DNA or chemical residues, decays over time, which can be modeled using exponential decay:
' "&chr(10)&"
' "&chr(10)&"C(t)=C0e-?t,C(t) = C_
'
End Sub
Sub Macro36()
'
' Macro36 Macro
'
' "&chr(10)&"y˜57.7-0.27=57.43 m.y \approx 57.7 - 0.27 = 57.43 \, \text{m}.
' "&chr(10)&"3. Area Estimation for Crime Scene Management
' "&chr(10)&"Using calculus, calculate the area of irregular crime scene perimeters. Divide the boundary into segments described by functions, and integ
'
End Sub
Sub Macro37()
'
' Macro37 Macro
' 4. Surveillance Analysis Using Camera Rotation
' "&chr(10)&"The angular velocity of a surveillance camera can be modeled as:
' "&chr(10)&"
```

```
' "&chr(10)&"?(t)=?t+12at2,\theta(t) = \omega t + \frac{1}{2} \alpha t^2,
' "&chr(10)&"where:
' "&chr(10)&"· ?(t)\theta(t): Angle rotated,
' "&chr(10)&"· ?\omega: Initial angular vel
'
End Sub
Sub Macro38()
'
' Macro38 Macro
' 1. Management Information Systems in Policing
' "&chr(10)&"Background:
' "&chr(10)&"· Management Information Systems (MIS) in policing are designed to collect, analyze, and disseminate crime data for decision-making and resource allocation.
' "&chr(10)&"· Applications include crime mappi
'
End Sub
Sub Macro39()
'
' Macro39 Macro
' Applied Policing and Crime Resolution
'
End Sub
Sub Macro40()
'
' Macro40 Macro
' 2. Investigative Techniques
' "&chr(10)&"•?Key Concepts:
' "&chr(10)&"o Conducting preliminary investigations.
' "&chr(10)&"o Using surveillance and undercover operations.
```

```
'


'
End Sub
Sub Macro41()
'
' Macro41 Macro
' 3. Evidence Handling and Analysis
' "&chr(10)&"•?Principles:
' "&chr(10)&"o Proper collection, labeling, and storage of evidence.
'


'
End Sub
Sub Macro42()
'
' Macro42 Macro
' 4. Legal Framework
' "&chr(10)&"•?Key Topics:
' "&chr(10)&"o Understanding the Criminal Procedure Act and Evidence Act.
'


'
End Sub
Sub Macro43()
'
' Macro43 Macro
' Applications in Law Enforcement
' "&chr(10)&"1. Forensic Investigation:
```

```
' "&chr(10)&"o Analyze evidence to reconstruct crime scenes.

' "&chr(10)&"2. Criminal Profiling:

' "&chr(10)&"o Use psychological and behavioral analysis to identify suspects.

' "&chr(10)&"3. Community Engagement:

'



'

End Sub

Sub Macro44()

'

' Macro44 Macro

' 3. Area Estimation for Crime Scene Management

' "&chr(10)&"Using calculus, calculate the area of irregular crime scene perimeters. Divide the boundary into segments described by functions, and integrate:

' "&chr(10)&"

' "&chr(10)&"A=?x1x2y(x) dx.A = \int_{x_1}^{x_2} y(x) \, dx.

'



'

End Sub

Sub Macro45()

'

' Macro45 Macro

' 5. Predictive Analytics for Crime Prevention

' "&chr(10)&"Using linear regression to predict crime patterns:

' "&chr(10)&"

' "&chr(10)&"y=mx+b,y = mx + b,

' "&chr(10)&"where:

' "&chr(10)&"•?yy: Predicted crime rate,
```

```
' "&chr(10)&"•?xx: Variable (e.g., population density),
' "&chr(10)&"•?mm: Slope of the trendline,
' "&chr(10)&"•?bb: Intercept.
'

'
   ActiveWindow.ActivePane.VerticalPercentScrolled = -145
End Sub
Sub Macro46()
'
' Macro46 Macro
' 5. Predictive Analytics for Crime Prevention
' "&chr(10)&"Using linear regression to predict crime patterns:
' "&chr(10)&"
' "&chr(10)&"y=mx+b,y = mx + b,
' "&chr(10)&"where:
' "&chr(10)&"•?yy: Predicted crime rate,
' "&chr(10)&"•?xx: Variable (e.g., population density),
' "&chr(10)&"•?mm: Slope of the trendline,
' "&chr(10)&"•?bb: Intercept.
'

'
End Sub
Sub Macro47()
'
' Macro47 Macro
' 2. Incident Collision Scenarios
' "&chr(10)&"Background:
```

' "&chr(10)&"•?Focuses on investigating road traffic collisions to determine causes and prevent future incidents.

' "&chr(10)&"•?Includes analyzing human, vehicle, and environmental factors.

'

'

ActiveWindow.ActivePane.SmallScroll Down:=23

End Sub

Sub Macro48()

'

' Macro48 Macro

' 2. Incident Collision Scenarios

' "&chr(10)&"Background:

' "&chr(10)&"•?Focuses on investigating road traffic collisions to determine causes and prevent future incidents.

' "&chr(10)&"•?Includes analyzing human, vehicle, and environmental factors.

'

'

End Sub

Sub Macro49()

'

' Macro49 Macro

' 4. Community Policing and Communication Skills

' "&chr(10)&"Background:

' "&chr(10)&"•?Community policing emphasizes collaboration between police and communities to solve problems and build trust.

' "&chr(10)&"•?Effective communication skills are essential for engaging with diverse populati

'

End Sub

```
Sub Macro50()
'
' Macro50 Macro
' 5. Operational Performance in Traffic Management
' "&chr(10)&"Background:
' "&chr(10)&"•?Traffic management involves optimizing road safety and flow through enforcement and education.
' "&chr(10)&"•?Operational performance measures include response times and accident reduction rates.
' "&chr(10)&"Exper
'
End Sub
Sub Macro51()
'
' Macro51 Macro
' 6. Principles of Police Investigation
' "&chr(10)&"Background:
' "&chr(10)&"•?Investigative principles include evidence preservation, chain of custody, and impartiality.
' "&chr(10)&"•?Focuses on systematic approaches to solving crimes.
' "&chr(10)&"Experimental Applications:
' "&chr(10)&"•?Conduct mock crime scen
'
End Sub
Sub Macro52()
'
' Macro52 Macro
' 7. Study Material for Police Firearms
' "&chr(10)&"Background:
' "&chr(10)&"•?Covers firearm handling, safety, and competency testing.
' "&chr(10)&"•?Includes theoretical knowledge and practical training.
```

```
' "&chr(10)&"Experimental Applications:

' "&chr(10)&"•?Practice firearm handling and target shooting in contro

'

End Sub

Sub Macro53()

'

' Macro53 Macro

' 1. Management Information Systems (MIS): Optimizing Police Patrol

' "&chr(10)&"•?Crime Hotspot Modeling Using Integrals: Crime density in a region can be modeled as a density function f(x,y)f(x, y), where xx and yy are spatial coordinates.

' "&chr(10)&"o Total crime density in a

'

End Sub

Sub Macro54()

'

' Macro54 Macro

'

' "&chr(10)&"D=?02p?02(r2) r dr d?.D = \int_0^{2\pi} \int_0^2 (r^2) \, r \, dr \, d\theta.

' "&chr(10)&"2. Compute:

' "&chr(10)&"\[ D = \int_0^{2\pi} \int_0^2 r^3 \, dr \, d\theta = \int_0^{2\pi} \left[\frac{r4}{4}\right]_02 d\theta = \int_0^{2\pi} 4 d\theta = 8\pi. \]

'



'

End Sub

Sub Macro55()

'

' Macro55 Macro

' 2. Incident Collision Scenarios
```

```
' "&chr(10)&"•?Projectile Motion and Trajectories: Use derivatives to determine speed and angles during a collision or vehicle impact.

' "&chr(10)&"o Position as a function of time s(t)s(t):

' "&chr(10)&"

' "&chr(10)&"v(t)=dsdt,a(t)=dvdt.v(t) = \frac{ds}{dt}, \quad a(

'

End Sub

Sub Macro56()

'

' Macro56 Macro

' Example: If s(t)=5t2+2ts(t) = 5t^2 + 2t, calculate velocity and acceleration:

' "&chr(10)&"1. Velocity:

' "&chr(10)&"

' "&chr(10)&"v(t)=dsdt=10t+2.v(t) = \frac{ds}{dt} = 10t + 2.

' "&chr(10)&"2. Acceleration:

' "&chr(10)&"

' "&chr(10)&"a(t)=dvdt=10 m/s2.a(t) = \frac{dv}{dt} = 10 \, \text{m/s}^2.

'



'

End Sub

Sub Macro57()

'

' Macro57 Macro

' 3. Patrol Research and Route Optimization

' "&chr(10)&"•?Travel Path Optimization Using Integrals: Minimize distance covered by patrol cars along a curve y=f(x)y = f(x).

' "&chr(10)&"o Total patrol distance:

' "&chr(10)&"
```

```
' "&chr(10)&"L=?ab1+(dydx)2 dx.L = \int_a^b \sqrt{1 + \left(\frac{dy}{dx}\righ
'
    ActiveWindow.ActivePane.SmallScroll Down:=18
End Sub
Sub Macro58()
'
' Macro58 Macro
' Example: If y=x2y = x^2 and xx ranges from 0 to 1:
' "&chr(10)&"1. Compute dydx=2x\frac{dy}{dx} = 2x, so:
' "&chr(10)&"
' "&chr(10)&"L=?011+(2x)2 dx=?011+4x2 dx.L = \int_0^1 \sqrt{1 + (2x)^2} \, dx = \int_0^1 \sqrt{1 + 4x^2}
\, dx.
' "&chr(10)&"2. Approximate using numerical methods.
'


'
End Sub
Sub Macro59()
'
' Macro59 Macro
' Example: If y=x2y = x^2 and xx ranges from 0 to 1:
' "&chr(10)&"1. Compute dydx=2x\frac{dy}{dx} = 2x, so:
' "&chr(10)&"
' "&chr(10)&"L=?011+(2x)2 dx=?011+4x2 dx.L = \int_0^1 \sqrt{1 + (2x)^2} \, dx = \int_0^1 \sqrt{1 + 4x^2}
\, dx.
' "&chr(10)&"2. Approximate using numerical methods.
'


'
```

```
End Sub
Sub Macro60()
'
' Macro60 Macro
' Example: If y=x2y = x^2 and xx ranges from 0 to 1:
' "&chr(10)&"1. Compute dydx=2x\frac{dy}{dx} = 2x, so:
' "&chr(10)&"
' "&chr(10)&"L=?011+(2x)2 dx=?011+4x2 dx.L = \int_0^1 \sqrt{1 + (2x)^2} \, dx = \int_0^1 \sqrt{1 + 4x^2} \, dx.
' "&chr(10)&"2. Approximate using numerical methods.
'


'
End Sub
Sub Macro61()
'
' Macro61 Macro
' 1. Compute:
' "&chr(10)&"\[ I = \int_0^3 10t^2 \, dt = \left[\frac{10t3}{3}\right]_03 = 90 \, \text{Ns}. \]
'


'
    ActiveWindow.ActivePane.SmallScroll Down:=17
End Sub
Sub Macro62()
'
' Macro62 Macro
' 5. Investigation Principles
```

' "&chr(10)&"•?Decay of Evidence Using Exponential Models: Biological or chemical evidence decays over time, modeled by:

' "&chr(10)&"

' "&chr(10)&"C(t)=C0e-?t,C(t) = C_0 e^{-\lambda t},

' "&chr(10)&"where ?\lambda is the decay rate.

' "&chr(10)&"Example: For C0=100 ngC_0 = 100 \, \t

'

End Sub

Sub Macro63()

'

' Macro63 Macro

' 6. Firearm Ballistics

' "&chr(10)&"•?Trajectory Calculations: The path of a bullet can be calculated using physics and derivatives:

' "&chr(10)&"o Horizontal range:

' "&chr(10)&"

' "&chr(10)&"R=v02sin?2?g,R = \frac{v_0^2 \sin 2\theta}{g},

' "&chr(10)&"where v0v_0: initial velocity, ?\theta: angle, g=9.8 m/s2g =

'

ActiveWindow.ActivePane.SmallScroll Down:=40

End Sub

Sub Macro64()

'

' Macro64 Macro

' Example: If v0=300 m/sv_0 = 300 \, \text{m/s} and ?=45°\theta = 45^\circ:

' "&chr(10)&"1. Range:

' "&chr(10)&"

' "&chr(10)&"R=3002sin?90°9.8=900009.8˜9183.67 m.R = \frac{300^2 \sin 90^\circ}{9.8} = \frac{90000}{9.8} \approx 9183.67 \, \text{m}.

'

```
'

    ActiveWindow.ActivePane.SmallScroll Down:=20

End Sub

Sub Macro65()

'

' Macro65 Macro

' Example: If v0=300 m/sv_0 = 300 \, \text{m/s} and ?=45°\theta = 45^\circ:

' "&chr(10)&"1. Range:

' "&chr(10)&"

' "&chr(10)&"R=3002sin?90°9.8=900009.8˜9183.67 m.R = \frac{300^2 \sin 90^\circ}{9.8} =
\frac{90000}{9.8} \approx 9183.67 \, \text{m}.

'


'

    ActiveWindow.ActivePane.LargeScroll Down:=1

    ActiveWindow.ActivePane.VerticalPercentScrolled = 0

End Sub
```

UserForm14 - 1
Private Sub Label1_Click()
End Sub
Private Sub Label4_Click()
End Sub
Private Sub Label9_Click()
End Sub
Private Sub MultiPage1_Change()
End Sub
Private Sub OptionButton1_Click()
End Sub
Private Sub SpinButton1_Change()
End Sub
Private Sub SpinButton2_Change()
End Sub
Private Sub TabStrip1_Change()
End Sub
Private Sub TextBox1_Change()
End Sub
Private Sub TextBox11_Change()
End Sub
Private Sub TextBox13_Change()
End Sub
Private Sub TextBox16_Change()
End Sub
Private Sub TextBox17_Change()
End Sub
Private Sub TextBox18_Change()
End Sub
Private Sub TextBox19_Change()
End Sub
Private Sub TextBox20_Change()
End Sub
Private Sub TextBox22_Change()
End Sub
Private Sub TextBox3_Change()
End Sub
Private Sub TextBox4_Change()UserForm14 - 2
End Sub
Private Sub TextBox5_Change()
End Sub
Private Sub TextBox6_Change()
End Sub
Private Sub TextBox8_Change()
End Sub
Private Sub TextBox9_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean, ByVal Data As MSForms.DataO
bject, ByVal X As Single, ByVal Y As Single, ByVal DragState As MSForms.fmDragState, ByVal Effect As M
SForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub TextBox9_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean, ByVal Action As MSForms.
fmAction, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal Effect As MSFo
rms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub TextBox9_BeforeUpdate(ByVal Cancel As MSForms.ReturnBoolean)

End Sub
Private Sub TextBox9_Change()
End Sub
Private Sub TextBox9_DblClick(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub TextBox9_DropButtonClick()
End Sub
Private Sub TextBox9_Enter()
End Sub
Private Sub TextBox9_Error(ByVal Number As Integer, ByVal Description As MSForms.ReturnString, ByVal S Code As Long, ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, ByVal Cance lDisplay As MSForms.ReturnBoolean)
End Sub
Private Sub TextBox9_Exit(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub TextBox9_KeyDown(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub TextBox9_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)
End Sub
Private Sub TextBox9_MouseDown(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV al Y As Single)
End Sub
Private Sub TextBox9_MouseMove(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV al Y As Single)UserForm14 - 3
End Sub
Private Sub TextBox9_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal Y As Single)
End Sub
Private Sub UserForm_Click()
End Sub1. Management Information Systems in Policing
Background:
· Management Information Systems (MIS) in policing are designed to collect, analyze, and disseminate crime data for decision-making and resource allocation.
· Applications include crime mapping, resource tracking, and performance monitoring.
Experimental Applications:
· Simulate crime data entry and analysis using MIS tools.
· Develop crime heatmaps to identify hotspots and allocate patrols effectively.
//policy academic poe s assessment policy poes student outcome visited theory 30, 70 practical center
criminal record center
managemnt system information
"text label 2 "=Background: Applied P
Applied Policing and Crime Resolution
Applications in Law Enforcement
Applications in Crime Resolution and
Prevention
2. Incident Collision Scenarios
Research Methods for Conducting Patrols
"txt_label3"=true
"txt_label 4"=true. Crime Scene Mana
"txt _label 5"=true
"txt_lbl6"=true
"txt_lbl7"=true
"txt _lbl"8=true
4. Community Policing and
Communication Skills
Operational Performance in Traffic
Management
"txt_label9"=true
Principles of Police Investigation
Study Material for Police Firearms
1. Crime Prevention:
Traffic Safety

Community Engagement
"txt_label10"=true
"txt_label11"=true
"txt_label12"=true
"txt_label13"=true
"txt_label14"=true
"txt_label15"=true
O
Frame1
ok
cancel
next
rigth protectiREPUBLIC OF SOUTH AFRICA
The Department of Justice and Constitutional Development
(DOJ&CD
IN THE HIGH COURT OF SOUTH AFRICA
boysen court office
Appeal Case
Number:
Ja 37/19,, ja 2461/15,;
A Quo Case
Number:

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criminal record center	"text label 2 "=Background: Applied P	4. Community Policing and Communication Skills	"txt_label9"=true
managemnt system information	"txt_label3"=true	Operational Performance in Traffic Management	"txt_label10"=true
Applied Policing and Crime Resolution	"txt_label 4"=true. Crime Scene Mana	Principles of Police Investigation	"txt_label11"=true
Applications in Law Enforcement	"txt _label 5"=true	Study Material for Police Firearms	"txt_label12"=true
Applications in Crime Resolution and Prevention	"txt_lbl6"=true	1. Crime Prevention:	"txt_label13"=true
2. Incident Collision Scenarios	"txt_lbl7"=true	Traffic Safety	"txt_label14"=true
Research Methods for Conducting Patrols	"txt _lbl"8=true	Community Engagement	"txt_label15"=true

rigth protectiREPUBLIC OF SOUTH AFRICA
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Number:
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A Quo Case

ok cancel next

```
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm14
   Caption         =   "UserForm14"
   ClientHeight    =   10068
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   20112
   OleObjectBlob   =   "UserForm14 policy project excell word cae macro ,
tshingombe.frx":0000
   StartUpPosition =   3  'Windows Default
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm14"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
Private Sub Label1_Click()

End Sub

Private Sub Label4_Click()

End Sub

Private Sub Label9_Click()

End Sub

Private Sub MultiPage1_Change()

End Sub

Private Sub OptionButton1_Click()

End Sub

Private Sub SpinButton1_Change()

End Sub

Private Sub SpinButton2_Change()

End Sub

Private Sub TabStrip1_Change()

End Sub

Private Sub TextBox1_Change()

End Sub

Private Sub TextBox11_Change()

End Sub
```

```
Private Sub TextBox13_Change()

End Sub

Private Sub TextBox16_Change()

End Sub

Private Sub TextBox17_Change()

End Sub

Private Sub TextBox18_Change()

End Sub

Private Sub TextBox19_Change()

End Sub

Private Sub TextBox20_Change()

End Sub

Private Sub TextBox22_Change()

End Sub

Private Sub TextBox3_Change()

End Sub

Private Sub TextBox4_Change()

End Sub

Private Sub TextBox5_Change()

End Sub

Private Sub TextBox6_Change()

End Sub

Private Sub TextBox8_Change()

End Sub

Private Sub TextBox9_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean,
ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal
DragState As MSForms.fmDragState, ByVal Effect As MSForms.ReturnEffect, ByVal
Shift As Integer)

End Sub
```

```
Private Sub TextBox9_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean,
ByVal Action As MSForms.fmAction, ByVal Data As MSForms.DataObject, ByVal X
As Single, ByVal Y As Single, ByVal Effect As MSForms.ReturnEffect, ByVal
Shift As Integer)

End Sub

Private Sub TextBox9_BeforeUpdate(ByVal Cancel As MSForms.ReturnBoolean)

End Sub

Private Sub TextBox9_Change()

End Sub

Private Sub TextBox9_DblClick(ByVal Cancel As MSForms.ReturnBoolean)

End Sub

Private Sub TextBox9_DropButtonClick()

End Sub

Private Sub TextBox9_Enter()

End Sub

Private Sub TextBox9_Error(ByVal Number As Integer, ByVal Description As
MSForms.ReturnString, ByVal SCode As Long, ByVal Source As String, ByVal
HelpFile As String, ByVal HelpContext As Long, ByVal CancelDisplay As
MSForms.ReturnBoolean)

End Sub

Private Sub TextBox9_Exit(ByVal Cancel As MSForms.ReturnBoolean)

End Sub

Private Sub TextBox9_KeyDown(ByVal KeyCode As MSForms.ReturnInteger, ByVal
Shift As Integer)

End Sub

Private Sub TextBox9_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)

End Sub

Private Sub TextBox9_MouseDown(ByVal Button As Integer, ByVal Shift As
Integer, ByVal X As Single, ByVal Y As Single)

End Sub

Private Sub TextBox9_MouseMove(ByVal Button As Integer, ByVal Shift As
Integer, ByVal X As Single, ByVal Y As Single)

End Sub
```

```
Private Sub TextBox9_MouseUp(ByVal Button As Integer, ByVal Shift As Integer,
ByVal X As Single, ByVal Y As Single)

End Sub

Private Sub UserForm_Click()

End Sub
```

Sub Macro2()

'

' Macro2 Macro

' current (I=dQdtI = \frac{dQ}{dt}), where the derivative of charge with respect to time gives the current.

' "&chr(10)&" · Integral Function (?f(x,y)dx\int f(x, y) dx):

'

End Sub

Sub Macro3()

'

' Macro3 Macro

' · Integral Function (?f(x,y)dx\int f(x, y) dx):

'

End Sub

Sub Macro4()

'

' Macro4 Macro

' Calculating the total energy in a capacitor (W=?V dQW = \int V \, dQ) or the area under the voltage-time graph for evaluating work done.

'

End Sub

Sub Macro5()

'

' Macro5 Macro

' : $$W = \int_0^Q V \, dQ$$

' "&chr(10)&" § Here, WW represents the energy stored, VV is voltage, and QQ is charge. Integration helps calculate the energy based on the charge distribution.

' "&chr(10)&" o Inductors: $$V = L \frac{dI}{dt

'

End Sub

Sub Macro6()

'

' Macro6 Macro

' Rate of Change in Current: $$I = \frac{dQ}{dt}$$

' "&chr(10)&" § This derivative links the charge flowing through a conductor over time to the current.

' "&chr(10)&" o Voltage in Changing Magnetic Fields (Faraday's Law): $$\mathcal{E}

'

End Sub

Sub Macro7()

'

' Macro7 Macro

' 1. Junior-Level Focus:

' "&chr(10)&" o Electrical Trade Theory (N1-N3):

' "&chr(10)&" § Covers foundational concepts like safety precautions, DC theory, conductors, and wiring systems.

' "&chr(10)&" § Practical applications i

'

End Sub

Sub Macro8()

'

' Macro8 Macro

' 1. Voltage Across a Capacitor: $$V(t) = \frac{1}{C} \int i(t) \, dt + V_0$$

' "&chr(10)&" o Application: Determines voltage V(t)V(t) across a capacitor, where i(t)i(t) is the current, CC is capacitance, and V0V_0 is the initial voltage.

'

```
End Sub

Sub Macro9()

'

' Macro9 Macro

' 2. Total Energy Stored in an Inductor: $$E = \frac{1}{2} L \int i^2(t) \, dt$$

' "&chr(10)&"      o Application: Calculates energy in an inductor, where LL is inductance and i(t)i(t) is current.

'



'

End Sub

Sub Macro10()

'

' Macro10 Macro

' 3. Charge in a Circuit: $$Q = \int I(t) \, dt$$

' "&chr(10)&"      o Application: Finds the total electric charge QQ flowing through a circuit over time, based on current I(t)I(t).

'

End Sub

Sub Macro11()

'

' Macro11 Macro

' 1. Current in a Capacitor: $$I(t) = C \frac{dV(t)}{dt}$$

' "&chr(10)&"      o Application: Relates the rate of change of voltage to the current flowing through a capacitor.

' "&chr(10)&"      2. Electromotive Force (Faraday's Law): $$\mathcal{E}

'

End Sub

Sub Macro12()

'
```

```
' Macro12 Macro
' Circuit Analysis:
' "&chr(10)&"      o Use integrals and derivatives to analyze RLC circuits and measure power dissipation.
' "&chr(10)&"      · Measuring Instruments:
' "&chr(10)&"      o Apply calculus to calibrate and interpret readings
'
End Sub
Sub Macro13()
'
' Macro13 Macro
' Circuit Analysis:
' "&chr(10)&"      o Use integrals and derivatives to analyze RLC circuits and measure power dissipation.
' "&chr(10)&"      · Measuring Instruments:
' "&chr(10)&"      o Apply calculus to calibrate and interpret readings
'
End Sub
Sub Macro14()
'
' Macro14 Macro
' 1. Junior-Level Roles: Maintenance technician, soldering specialist, or assistant in electrical installations.
' "&chr(10)&"      2. Senior-Level Roles: Electrical engineer, system designer, or project manager overseeing large-scale installations and
'
End Sub
Sub Macro1()
'
' Macro1 Macro
' · Derivative Function (f'(x, y)):
```

```
' "&chr(10)&"      o Derivatives measure the rate of change of a function, essential for analyzing varying electrical quantities like current (I), voltage (V), and resistance (R).
' "&chr(10)&"      o Example in
'


End Sub
Sub Macro15()
'
' Macro15 Macro
' ?f(x)g'(x)dx=f(x)g(x)-?g(x)f'(x)dx.\int f(x) g'(x) dx = f(x) g(x) - \int g(x) f'(x) dx.
' "&chr(10)&"      · Example: Integrate ?xexdx\int x e^x dx:
' "&chr(10)&"      1. Set f(x)=xf(x) = x and g'(x)=exg'(x) = e^x.
'
End Sub
Sub Macro16()
'
' Macro16 Macro
'
' "&chr(10)&"      f'(x)=1,g(x)=ex.f'(x) = 1, \quad g(x) = e^x.
' "&chr(10)&"      3. Apply the formula:
' "&chr(10)&"
' "&chr(10)&"      ?xexdx=xex-?exdx=xex-ex+C.\int x e^x dx = x e^x - \int e^x dx = x e^x - e^x + C.
'
   Selection.MoveDown Unit:=wdLine, Count:=19
End Sub
Sub Macro17()
'
' Macro17 Macro
'
```

```
' "&chr(10)&"      f'(x)=1,g(x)=ex.f'(x) = 1, \quad g(x) = e^x.

' "&chr(10)&"      3. Apply the formula:

' "&chr(10)&"

' "&chr(10)&"      ?xexdx=xex-?exdx=xex-ex+C.\int x e^x dx = x e^x - \int e^x dx = x e^x - e^x + C.

'

End Sub

Sub Macro18()

'

' Macro18 Macro

'

' "&chr(10)&"      ?sin?2(x)dx=?12dx-?cos?(2x)2dx=x2-sin?(2x)4+C.\int \sin^2(x) dx = \int \frac{1}{2} dx -
\int \frac{\cos(2x)}{2} dx = \frac{x}{2} - \frac{\sin(2x)}{4} + C.

' "&chr(10)&"      3. Completing the Square:

' "&chr(10)&"      o Transform qu

'

End Sub

Sub Macro19()

'

' Macro19 Macro

'

' "&chr(10)&"      o Example: Integrate ?1x2+6x+10dx\int \frac{1}{x^2 + 6x + 10} dx.

' "&chr(10)&"      § Complete the square: x2+6x+10=(x+3)2+1x^2 + 6x + 10 = (x + 3)^2 + 1.

' "&chr(10)&"      § Use the formula for inverse tangent:

' "&chr(10)&"

'

End Sub

Sub Macro20()

'

' Macro20 Macro
```

```
'

' "&chr(10)&"      2(x+3)3?Ax+3+B(x+3)2+C(x+3)3.\frac{2}{(x+3)^3} \to \frac{A}{x+3} + \frac{B}{(x+3)^2} +
\frac{C}{(x+3)^3}.

' "&chr(10)&"      · Case 2: Two Recursive Factors:

' "&chr(10)&"

' "&chr(10)&"      5x(x-1)2(2x-5)?A(x-1)+B(x-1)2+C

'

End Sub

Sub Macro21()

'

' Macro21 Macro

' 5x(x-1)2(2x-5)?A(x-1)+B(x-1)2+C(2x-5).\frac{5x}{(x-1)^2 (2x-5)} \to \frac{A}{(x-1)} + \frac{B}{(x-1)^2} +
\frac{C}{(2x-5)}.

'

End Sub

Sub Macro22()

'

' Macro22 Macro

' 5x(x-1)2(2x-5)?A(x-1)+B(x-1)2+C(2x-5).\frac{5x}{(x-1)^2 (2x-5)} \to \frac{A}{(x-1)} + \frac{B}{(x-1)^2} +
\frac{C}{(2x-5)}.

'

End Sub

Sub Macro23()

'

' Macro23 Macro

'

' "&chr(10)&"      A=?01[(x+2)-x2]dx=?01(-x2+x+2)dx.A = \int_0^1 [(x+2) - x^2] dx = \int_0^1 (-x^2 + x + 2)
dx.

' "&chr(10)&"      Compute:

' "&chr(10)&"
```

```
' "&chr(10)&"      ?01(-x2+x+2)dx=[-x33+x22+2x]01=-13+12+2=136.\int_0^1 (-x^2 + x + 2)
'
End Sub
Sub Macro24()
'
' Macro24 Macro
'
' "&chr(10)&"      V=p?ab[f(x)]2dx.V = \pi \int_a^b [f(x)]^2 dx.
' "&chr(10)&"      · Shell Method:
' "&chr(10)&"
' "&chr(10)&"      V=2p?abxf(x)dx.V = 2\pi \int_a^b x f(x) dx.
'


'
End Sub
Sub Macro25()
'
' Macro25 Macro
' 1. Formula:
' "&chr(10)&"      \[ V = \pi \int_0^1 (x2)2 dx = \pi \int_0^1 x^4 dx. \]
' "&chr(10)&"      2. Compute:
' "&chr(10)&"      \[ V = \pi \left[\frac{x5}{5}\right]_01 = \frac{\pi}{5}. \]
'
End Sub
Sub Macro26()
'
' Macro26 Macro
' x2=4-x2  ?  2x2=4  ?  x=±2.x^2 = 4 - x^2 \implies 2x^2 = 4 \implies x = \pm\sqrt{2}.
' "&chr(10)&"      Intersection points are (2,2)(\sqrt{2}, 2) and (-2,2)(-\sqrt{2}, 2).
```

'

End Sub

Sub Macro27()

'

' Macro27 Macro

'

' "&chr(10)&" A=?-22[(4-x2)-x2]dx=?-22(4-2x2)dx.A = \int_{-\sqrt{2}}^{\sqrt{2}} [(4 - x^2) - x^2] dx = \int_{-\sqrt{2}}^{\sqrt{2}} (4 - 2x^2) dx.

' "&chr(10)&" Compute:

' "&chr(10)&" \[A = [4x - \frac{2x3}{3}]_{-\sqrt{2}}{\

'

End Sub

Sub Macro28()

'

' Macro28 Macro

'

' "&chr(10)&" x¯=?abx[f(x)-g(x)]dx?ab[f(x)-g(x)]dx.\bar{x} = \frac{\int_a^b x [f(x) - g(x)] dx}{\int_a^b [f(x) - g(x)] dx}.

' "&chr(10)&" · Example: For y=x2y = x^2, find x¯\bar{x} over [0,1][0, 1]:

' "&chr(10)&"

' "&chr(10)&"

'

End Sub

Sub Macro29()

'

' Macro29 Macro

' Compute numerator:

' "&chr(10)&"

' "&chr(10)&" ?01x3dx=x44|01=14.\int_0^1 x^3 dx = \frac{x^4}{4} \big|_0^1 = \frac{1}{4}.

```
' "&chr(10)&"      Compute denominator:
' "&chr(10)&"
' "&chr(10)&"      ?01x2dx=x33|01=13.
'
End Sub
Sub Macro30()
'
' Macro30 Macro
'
' "&chr(10)&"      Ix=?ab[f(x)]2dx.I_x = \int_a^b [f(x)]^2 dx.
' "&chr(10)&"      2. Moment of Inertia:
' "&chr(10)&"      o For solids:
' "&chr(10)&"
' "&chr(10)&"      I=?abx2[f(x)]dx.I = \int_a^b x^2 [f(x)] dx.
'


'
End Sub
Sub Macro31()
'
' Macro31 Macro
' : Find the area between y=x2y = x^2 and y=4-x2y = 4 - x^2 over x=-2x = -\sqrt{2} to x=2x = \sqrt{2}:
' "&chr(10)&"
' "&chr(10)&"      A=?-22[(4-x2)-x2]dx=?-22(4-2x2)dx.A = \int_{-\sqrt{2}}^{\sqrt{2}} [(4 - x^2) - x^2] dx =
\int_{-\sqrt{2}}
'
End Sub
Sub Macro32()
'
```

```
' Macro32 Macro

' Polar form representation (modulus r=x2+y2r = \sqrt{x^2 + y^2} and argument ?=tan?-1(y/x)\theta = \tan^{-1}(y/x)) is crucial for simplifying multiplications and divisions.

'

End Sub

Sub Macro33()

'

' Macro33 Macro

' o Formula: D=ad-bcD = ad - bc.

' "&chr(10)&"      o Example Calculation: If D=[63-23]D = \begin{bmatrix} 6 & 3 \\ -2 & 3 \end{bmatrix}, then:

' "&chr(10)&"

' "&chr(10)&"      D=(6·3)-(3·-2)=18+6=24.D = (6 \cdot 3) - (3 \cdot -2) = 18

'

   Selection.MoveDown Unit:=wdLine, Count:=22

End Sub

Sub Macro34()

'

' Macro34 Macro

' D=[abcdefghi],D = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix},

' "&chr(10)&"      the determinant is:

' "&chr(10)&"

' "&chr(10)&"      D=a(ei-fh)-b(di-fg)+c(dh-eg).D = a(ei - fh) - b(di - fg) + c(dh - eg).

'

End Sub

Sub Macro35()

'

' Macro35 Macro

' D=[abcdefghi],D = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix},
```

```
' "&chr(10)&"      the determinant is:

' "&chr(10)&"

' "&chr(10)&"      D=a(ei-fh)-b(di-fg)+c(dh-eg).D = a(ei - fh) - b(di - fg) + c(dh - eg).

'

End Sub

Sub Macro36()

'

' Macro36 Macro

'

' "&chr(10)&"      o Using conjugates, divide (3+2i)(3 + 2i) by (1-i)(1 - i): Multiply numerator and denominator by (1+i)(1 + i):

' "&chr(10)&"      \[ \frac{(3+2i)}{(1-i)} = \frac{(3+2i)(1+i)}{(1-i)(1+i)} = \frac{3+3i+2i+2i2}{1+12} = \frac{1+5i}{2}. \]

'

End Sub

Sub Macro37()

'

' Macro37 Macro

'

' "&chr(10)&"      o Convert z=3+4iz = 3 + 4i: Modulus: r=32+42=5r = \sqrt{3^2 + 4^2} = 5. Argument: ?=tan?-1(43)˜53.1°\theta = \tan^{-1}(\frac{4}{3}) \approx 53.1^\circ. Polar Form: z=5(cos?53.1°+isin?53.1°)z = 5(\cos 53.1^\circ + i\sin 53.1^\circ).

'

   Selection.MoveDown Unit:=wdLine, Count:=132

   Selection.MoveUp Unit:=wdLine, Count:=36

End Sub

Sub Macro38()

'

' Macro38 Macro

'
```

```
' "&chr(10)&"      o Convert z=3+4iz = 3 + 4i: Modulus: r=32+42=5r = \sqrt{3^2 + 4^2} = 5.
Argument: ?=tan?-1(43)˜53.1°\theta = \tan^{-1}(\frac{4}{3}) \approx 53.1^\circ. Polar Form:
z=5(cos?53.1°+isin?53.1°)z = 5(\cos 53.1^\circ + i\sin 53.1^\circ).
'

End Sub

Sub Macro39()

'

' Macro39 Macro

' o x3?3x2x^3 \to 3x^2, 5x2?10x5x^2 \to 10x, -x?-1-x \to -1, 7?07 \to 0.

' "&chr(10)&"      2. Result: dydx=3x2+10x-1\frac{dy}{dx} = 3x^2 + 10x - 1.

'



'

   Selection.MoveDown Unit:=wdLine, Count:=31

End Sub

Sub Macro40()

'

' Macro40 Macro

'

' "&chr(10)&"      (x+y)3=x3+3x2y+3xy2+y3.(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3.

' "&chr(10)&"      3. Differentiation from First Principles:

' "&chr(10)&"      o Define dydx\frac{dy}{dx} as:

' "&chr(10)&"

' "&chr(10)&"      lim?h?0f(x+

'

End Sub

Sub Macro41()

'

' Macro41 Macro
```

```
' o Let u=2xu = 2x, then:
' "&chr(10)&"
' "&chr(10)&"      ddx[sin?(u)]=cos?(u)·dudx.\frac{d}{dx}[\sin(u)] = \cos(u) \cdot \frac{du}{dx}.
' "&chr(10)&"      Substituting u=2xu = 2x:
' "&chr(10)&"
' "&chr(10)&"      ddx[s
'
   Selection.MoveDown Unit:=wdLine, Count:=71
End Sub
Sub Macro42()
'
' Macro42 Macro
' o Integrate ?xndx\int x^n dx:
' "&chr(10)&"
' "&chr(10)&"      ?xndx=xn+1n+1+C(if n?-1).\int x^n dx = \frac{x^{n+1}}{n+1} + C \quad (\text{if } n \neq
-1).
' "&chr(10)&"      2. Trigonometric Integration:
' "&chr(10)&"      o Exa
'
   Selection.MoveDown Unit:=wdLine, Count:=150
End Sub
Sub Macro43()
'
' Macro43 Macro
'
' "&chr(10)&"      · Power Rule: If f(x)=xnf(x) = x^n, then f'(x)=n·xn-1f'(x) = n \cdot x^{n-1}. Example:
f(x)=x3  ?  f'(x)=3x2f(x) = x^3 \implies f'(x) = 3x^2.
' "&chr(10)&"      · Constant Rule: If f(x)=cf(x) = c, where cc is constant, then f'(x)=0f'(x) = 0. Exam
'
```

```
End Sub

Sub Macro44()

'

' Macro44 Macro

' 2. Advanced Rules

' "&chr(10)&"      For more complex functions:

' "&chr(10)&"      · Product Rule: If f(x)=u(x)·v(x)f(x) = u(x) \cdot v(x), then f'(x)=u'(x)·v(x)+u(x)·v'(x)f'(x) = u'(x) \cdot v(x) + u(x) \cdot v'(x). Example: f(x)=x·sin?(x)  ?

'

End Sub

Sub Macro45()

'

' Macro45 Macro

' Real-World Example

' "&chr(10)&"      Let’s calculate the derivative of f(x)=3x2+5x+2f(x) = 3x^2 + 5x + 2, representing velocity in an engineering context:

' "&chr(10)&"      1. Differentiate each term:

' "&chr(10)&"      o 3x2  ?  6x3x^2 \

'

   Selection.MoveDown Unit:=wdLine, Count:=145

End Sub

Sub Macro46()

'

' Macro46 Macro

' o The limit describes the value a function approaches as the input gets close to a specific point. Notation: lim?x?af(x)\lim_{x \to a} f(x).

' "&chr(10)&"      o Example: Find lim?x?2(x2-4)\lim_{x \to 2} (x^2 - 4):

' "&chr(10)&"

'

End Sub
```

```
Sub Macro47()
'
' Macro47 Macro
'   o Forms like 00\frac{0}{0} are resolved by simplifying the function or applying L'Hôpital's rule (if allowed).
' "&chr(10)&"      4. Continuity
' "&chr(10)&"      1. Definition:
' "&chr(10)&"      o A function f(x)f(x) is continuous at x=a
'
End Sub
Sub Macro48()
'
' Macro48 Macro
'
' "&chr(10)&"
' "&chr(10)&"      x=-4±42-4(2)(-6)2(2)=-4±16+484=-4±644.x = \frac{-4 \pm \sqrt{4^2 - 4(2)(-6)}}{2(2)} = \frac{-4 \pm \sqrt{16 + 48}}{4} = \frac{-4 \pm \sqrt{64}}{4}.
' "&chr(10)&"      3. Simplify:
' "&chr(10)&"
'
End Sub
Sub Macro49()
'
' Macro49 Macro
'
' "&chr(10)&"      vr=vA2+vB2=402+302=1600+900=2500=50 km/h.v_r = \sqrt{v_A^2 + v_B^2} = \sqrt{40^2 + 30^2} = \sqrt{1600 + 900} = \sqrt{2500} = 50 \, \text{km/h}.
' "&chr(10)&"      2. Shortest Distance:
' "&chr(10)&"      o If both cars are moving tow
'
```

```
    Selection.MoveDown Unit:=wdLine, Count:=53
End Sub
Sub Macro50()
'
' Macro50 Macro
' A ball is projected horizontally from a height of 5 m5 \, \text{m} with an initial velocity of 10 m/s10 \, \text{m/s}. Calculate the time of flight and range:
' "&chr(10)&"      1. Time of Flight: Using h=12gt2h = \frac{1}{2} g t^2, solve:
'
End Sub
Sub Macro51()
'
' Macro51 Macro
'
' "&chr(10)&"      5=12·9.8·t2  ?  t=109.8˜1.01 s.5 = \frac{1}{2} \cdot 9.8 \cdot t^2 \implies t = \sqrt{\frac{10}{9.8}} \approx 1.01 \, \text{s}.
' "&chr(10)&"      2. Range: Horizontal distance: x=v·tx = v \cdot t:
' "&chr(10)&"
'
End Sub
Sub Macro52()
'
' Macro52 Macro
' A wheel rotates at 10 rad/s10 \, \text{rad/s} with an angular acceleration of 2 rad/s22 \, \text{rad/s}^2. Find the angular displacement after 5 s5 \, \text{s}:
' "&chr(10)&"      1. Use:
' "&chr(10)&"
' "&chr(10)&"      ?=?t+12at2.\t
'
    Selection.MoveDown Unit:=wdLine, Count:=26
```

```
End Sub
Sub Macro53()
'
' Macro53 Macro
' F=ma=1000·2=2000 N.F = ma = 1000 \cdot 2 = 2000 \, \text{N}.
'
    Selection.MoveDown Unit:=wdLine, Count:=35
End Sub
Sub Macro54()
'
' Macro54 Macro
' F=ma=1000·2=2000 N.F = ma = 1000 \cdot 2 = 2000 \, \text{N}.
'
    Selection.MoveDown Unit:=wdLine, Count:=27
End Sub
Sub Macro55()
'
' Macro55 Macro
' 1. Use F=P·AF = P \cdot A:
' "&chr(10)&"
' "&chr(10)&"      A=p·(0.52)2=0.196 m2,A = \pi \cdot \left(\frac{0.5}{2}\right)^2 = 0.196 \, \text{m}^2,
' "&chr(10)&"
' "&chr(10)&"      F=500·0.196=98.1 kN.F = 500 \cdot 0.196 = 9
'
    Selection.MoveDown Unit:=wdLine, Count:=27
End Sub
Sub Macro56()
'
' Macro56 Macro
```

' Example: A steel rod with L=2 mL = 2 \, \text{m} and cross-sectional area A=0.01 m2A = 0.01 \, \text{m}^2 stretches by ?L=0.002 m\Delta L = 0.002 \, \text{m}. Find the stress if E=2·105 MPaE = 2 \cdot 10^5 \, \text{MPa}:

' "&chr(10)&" 1. Strain:

'

End Sub

Sub Macro57()

'

' Macro57 Macro

' 2. Stress:

' "&chr(10)&"

' "&chr(10)&" s=E·?=2·105·0.001=200 MPa.\sigma = E \cdot \epsilon = 2 \cdot 10^5 \cdot 0.001 = 200 \, \text{MPa}.

'

'

End Sub

Sub Macro58()

'

' Macro58 Macro

' A gas at 1 atm1 \, \text{atm} and 300 K300 \, \text{K} has a volume 2 m32 \, \text{m}^3. Find its final volume if the pressure is halved:

' "&chr(10)&" 1. Using Boyle's Law (P1V1=P2V2P_1 V_1 = P_2 V_2):

' "&chr(10)&"

'

  Selection.MoveDown Unit:=wdLine, Count:=32

End Sub

Sub Macro59()

'

' Macro59 Macro

```
' A gas at 1 atm1 \, \text{atm} and 300 K300 \, \text{K} has a volume 2 m32 \, \text{m}^3. Find its final volume if the pressure is halved:

' "&chr(10)&"      1. Using Boyle's Law (P1V1=P2V2P_1 V_1 = P_2 V_2):

' "&chr(10)&"

'

   Selection.MoveDown Unit:=wdLine, Count:=24

End Sub

Sub Macro60()

'

' Macro60 Macro

' 1. Angular Velocity:

' "&chr(10)&"

' "&chr(10)&"      ?=at=4·3=12 rad/s.\omega = \alpha t = 4 \cdot 3 = 12 \, \text{rad/s}.

' "&chr(10)&"      2. Work Done:

' "&chr(10)&"

' "&chr(10)&"      W=12I?2=12·2·122=144 J.W = \

'

End Sub

Sub Macro61()

'

' Macro61 Macro

'

' "&chr(10)&"      P=Q·?P?,P = \frac{Q \cdot \Delta P}{\eta},

' "&chr(10)&"      where Q=0.5/60 m3/sQ = 0.5/60 \, \text{m}^3/\text{s}, ?P=2×106 Pa\Delta P = 2 \times 10^6 \, \text{Pa}, and assume ?=0.85\eta = 0.85:

' "&chr(10)&"

'

End Sub

Sub Macro62()
```

```
'
' Macro62 Macro
'
' "&chr(10)&"      A=p·(0.025)2=1.96×10-3 m2.A = \pi \cdot (0.025)^2 = 1.96 \times 10^{-3} \, \text{m}^2.
' "&chr(10)&"      2. Stress:
' "&chr(10)&"
' "&chr(10)&"      s=FA=800001.96×10-3˜4.08×107 Pa.\sigma = \frac{F}{A} = \frac{80000}{1.96
'
End Sub
Sub Macro63()
'
' Macro63 Macro
'   Advanced Example: A gas undergoes an isothermal expansion from P1=3 atm,V1=2 m3P_1 = 3 \,
\text{atm}, V_1 = 2 \, \text{m}^3 to V2=5 m3V_2 = 5 \, \text{m}^3. Calculate the work done:
' "&chr(10)&"
' "&chr(10)&"      W=P1V1ln?(V2V1),W = P_1
'
   Selection.MoveDown Unit:=wdLine, Count:=173
End Sub
Sub Macro64()
'
' Macro64 Macro
' Z=R2+(XL-XC)2,Z = \sqrt{R^2 + (X_L - X_C)^2},
' "&chr(10)&"      where XL=2pfLX_L = 2\pi fL and XC=12pfCX_C = \frac{1}{2\pi fC}.
' "&chr(10)&"      · Use phasor diagrams to analyze voltage and current relationships.
' "&chr(10)&"      · Pow
'
End Sub
Sub Macro65()
```

```
'

' Macro65 Macro

' o Resistance (RR) = 10 O10 \, \Omega,

' "&chr(10)&"      o Inductive Reactance (XLX_L) = 15 O15 \, \Omega,

' "&chr(10)&"      o Capacitive Reactance (XCX_C) = 5 O5 \, \Omega:

' "&chr(10)&"

' "&chr(10)&"      Z=R2+(XL-XC)2=102+(15

'

End Sub

Sub Macro66()

'

' Macro66 Macro

'

' "&chr(10)&"      Z=R2+(XL-XC)2=102+(15-5)2=100+100=14.14 O.Z = \sqrt{R^2 + (X_L - X_C)^2} =
\sqrt{10^2 + (15 - 5)^2} = \sqrt{100 + 100} = 14.14 \, \Omega.

' "&chr(10)&"      General Assessment Guidelines

' "&chr(10)&"      1. Practical Applications:

'

   Selection.MoveDown Unit:=wdLine, Count:=61

End Sub

Sub Macro67()

'

' Macro67 Macro

' Z=R2+(XL-XC)2,XL=2pfL,XC=12pfC.Z = \sqrt{R^2 + (X_L - X_C)^2}, \quad X_L = 2\pi fL, \quad X_C =
\frac{1}{2\pi fC}.

' "&chr(10)&"      3. Resonance:

' "&chr(10)&"      o Achieved when XL=XCX_L = X_C. Use:

' "&chr(10)&"

'
```

```
    Selection.MoveDown Unit:=wdLine, Count:=24
End Sub
Sub Macro68()
'
' Macro68 Macro
'
' "&chr(10)&"      Example Problem: A convection heater operates with 2 kW2 \, \text{kW}. Find the energy used in 5 hours5 \, \text{hours}:
' "&chr(10)&"
' "&chr(10)&"      E=P·t=2·5=10 kWh.E = P \cdot t = 2 \cdot 5 = 10 \, \text{kWh}.
'
    Selection.MoveDown Unit:=wdLine, Count:=21
End Sub
Sub Macro69()
'
' Macro69 Macro
' Example Problem: An LED lamp uses 10 W10 \, \text{W} and operates for 4 hours/day4 \, \text{hours/day}. Calculate energy consumption in one month:
' "&chr(10)&"
' "&chr(10)&"      E=P·t·days=10·4·30=1.2 kWh.E = P \cdot t \cdot \text{days}
'
    Selection.MoveDown Unit:=wdLine, Count:=28
    Selection.MoveUp Unit:=wdLine, Count:=37
    Selection.Copy
End Sub
Sub Macro70()
'
' Macro70 Macro
' Module 4: Programmable Logic Controllers (PLCs)
```

```
' "&chr(10)&"      Key Topics:
' "&chr(10)&"      · Define PLCs, their components, and their programming languages (e.g., ladder logic).
' "&chr(10)&"      Practical Insights: PLC applications
'
   Selection.MoveDown Unit:=wdLine, Count:=23
   Selection.Copy
End Sub
Sub Macro71()
'
' Macro71 Macro
'
' "&chr(10)&"      o Calculate back emf:
' "&chr(10)&"
' "&chr(10)&"      Eb=V-IaRa.E_b = V - I_aR_a.
' "&chr(10)&"      2. Motor Torque:
' "&chr(10)&"      o Use:
' "&chr(10)&"
' "&chr(10)&"      T=kIa?.T = k I_a \ph
'
   Selection.MoveDown Unit:=wdLine, Count:=17
   Selection.Copy
End Sub
Sub Macro72()
'
' Macro72 Macro
' Example Problem: Find the torque of a DC motor with Ia=10 AI_a = 10 \, \text{A}, ?=0.02 Wb\phi = 0.02 \, \text{Wb}, and k=1k = 1:
' "&chr(10)&"
' "&chr(10)&"      T=kIa?=1·10·0.02=0.2 Nm.T = k I_a \phi = 1 \cdot 10 \cdot 0.02 = 0.2 \, \tex
```

```
'
    Selection.MoveRight Unit:=wdCharacter, Count:=1
    Selection.MoveDown Unit:=wdLine, Count:=26
    Selection.Copy
End Sub
Sub Macro73()
'
' Macro73 Macro
'
' "&chr(10)&"      S=ns-nrns,ns=120fP.S = \frac{n_s - n_r}{n_s}, \quad n_s = \frac{120f}{P}.
' "&chr(10)&"      Example Problem: For a motor with f=50 Hzf = 50 \, \text{Hz} and P=4P = 4, calculate synchronous speed:
' "&chr(10)&"
'
    Selection.MoveDown Unit:=wdLine, Count:=31
    Selection.Copy
End Sub
Sub Macro74()
'
' Macro74 Macro
'
' "&chr(10)&"      Example Problem: A transformer has Pcore=200 WP_{core} = 200 \, \text{W} and Pcopper=300 WP_{copper} = 300 \, \text{W}. Calculate efficiency when delivering Pout=1000 WP_{out} = 1000 \, \text{W}:
' "&chr(10)&"
' "&chr(10)&"      ?
'
    Selection.MoveDown Unit:=wdLine, Count:=20
    Selection.Copy
End Sub
```

```
Sub Macro75()
'
' Macro75 Macro
'
' "&chr(10)&"      · System earthing for safety and fault detection.
' "&chr(10)&"      · Earthing networks and neutral conductor importance.
' "&chr(10)&"      Practical Insights: Proper earthing prevents hazards such as electric shocks and ensures f
'
   Selection.MoveDown Unit:=wdLine, Count:=39
   Selection.MoveUp Unit:=wdLine, Count:=1
   Selection.MoveDown Unit:=wdLine, Count:=25
   Selection.Copy
End Sub
Sub Macro76()
'
' Macro76 Macro
'
' "&chr(10)&"      Enhanced Example: A geyser thermostat heats 50 kg50 \, \text{kg} of water from 25°C25^\circ \text{C} to 80°C80^\circ \text{C}. Find the energy required if the specific heat capacity of water is 4200 J/kg°C4200 \, \text{J/kg}^\circ\text{C}:
'
   Selection.MoveDown Unit:=wdLine, Count:=22
   Selection.Copy
End Sub
Sub Macro77()
'
' Macro77 Macro
'
```

```
' "&chr(10)&"      E=50·4200·55=11,550,000 J or 11.55 MJ.E = 50 \cdot 4200 \cdot 55 = 11,550,000 \, \text{J} \, \text{or} \, 11.55 \, \text{MJ}.

' "&chr(10)&"      Module 3: Lighting Systems

' "&chr(10)&"      Expanded Example: A compact f

'

   Selection.Copy

   Selection.Copy

End Sub

Sub Macro78()

'

' Macro78 Macro

' Expanded Example: A compact fluorescent lamp operates at 15 W15 \, \text{W} for 10 hours/day10 \, \text{hours/day}. Calculate energy consumption for 30 days30 \, \text{days}.

' "&chr(10)&"      Solution:

' "&chr(10)&"      1. Daily Energy:

'

End Sub

Sub Macro79()

'

' Macro79 Macro

' Edaily=P·t=15·10=150 Wh.E_{\text{daily}} = P \cdot t = 15 \cdot 10 = 150 \, \text{Wh}.

' "&chr(10)&"      2. Monthly Energy:

' "&chr(10)&"

' "&chr(10)&"      Emonthly=150·30=4500 Wh=4.5 kWh.E_{\text{monthly}} = 150 \cdot 30 = 4500 \,

'

   Selection.Copy

End Sub

Sub Macro80()

'
```

```
' Macro80 Macro

' Advanced Torque Calculation: A DC motor draws Ia=15 AI_a = 15 \, \text{A} with a magnetic flux
of ?=0.03 Wb\phi = 0.03 \, \text{Wb}. Find the armature torque if k=1.2k = 1.2.

' "&chr(10)&"      Solution:

' "&chr(10)&"      1. Torque:

'

   Selection.Copy

End Sub

Sub Macro81()

'

' Macro81 Macro

' T=kIa?=1.2·15·0.03=0.54 Nm.T = k I_a \phi = 1.2 \cdot 15 \cdot 0.03 = 0.54 \, \text{Nm}.

' "&chr(10)&"      Module 6: Alternating Current Machines

' "&chr(10)&"      Speed Analysis Example: For a three-phase induction motor with f=60 Hzf = 60 \,

'

   Selection.Copy

End Sub

Sub Macro82()

'

' Macro82 Macro

'

' "&chr(10)&"      ns=120fP=120·604=1800 RPM.n_s = \frac{120f}{P} = \frac{120 \cdot 60}{4} = 1800 \,
\text{RPM}.

' "&chr(10)&"      2. Rotor Speed:

' "&chr(10)&"

' "&chr(10)&"      nr=ns(1-S)=1800(1-0.05)=1710 RPM.n_r = n_s (1 - S) = 1800 (

'

   Selection.MoveDown Unit:=wdLine, Count:=198

   Selection.Copy
```

```
End Sub
Sub Macro83()
'
' Macro83 Macro
' Promotional Mark: 40% ICASS + 60% Exam marks (minimum 40% required for exam qualification).
' "&chr(10)&"      Exam Setup:
' "&chr(10)&"      · Duration: 3 hours.
' "&chr(10)&"      · Closed book, formula sheet included.
'
   Selection.Copy
End Sub
Sub Macro84()
'
' Macro84 Macro
'
' "&chr(10)&"      o Application: 30–40%.
' "&chr(10)&"      o Analysis/Evaluation: 20–25%.
' "&chr(10)&"      Mark Allocation by Module
' "&chr(10)&"      Module  Weighting (%)
' "&chr(10)&"      Principles of Electricity   30
'


'
   Selection.MoveDown Unit:=wdLine, Count:=43
   Selection.Copy
End Sub
Sub Macro85()
'
' Macro85 Macro
```

```
'
' "&chr(10)&"      B=μI2pr,B = \frac{\mu I}{2 \pi r},
' "&chr(10)&"      where μ\mu is permeability.
' "&chr(10)&"      3. Inductance in DC Circuits:
' "&chr(10)&"      o Find inductance:
' "&chr(10)&"
' "&chr(10)&"      L=N2μAl,L
'
   Selection.MoveDown Unit:=wdLine, Count:=65
   ActiveWindow.ActivePane.VerticalPercentScrolled = -103
   Selection.Copy
End Sub
Sub Macro86()
'
' Macro86 Macro
'
' "&chr(10)&"      To calculate the energy dissipated in resistive circuits over time, use:
' "&chr(10)&"
' "&chr(10)&"      E=?0TP(t) dt,P(t)=I(t)2R.E = \int_0^T P(t) \, dt, \quad P(t) = I(t)^2 R.
' "&chr(10)&"      Example: A resistor
'
   Selection.Copy
End Sub
Sub Macro87()
'
' Macro87 Macro
'
' "&chr(10)&"      1. Substitute I(t)I(t):
' "&chr(10)&"
```

```
' "&chr(10)&"      E=?02(4sin?(pt))2·5 dt=5?0216sin?2(pt) dt.E = \int_0^2 (4 \sin(\pi t))^2 \cdot 5 \, dt = 5 \int_0^2 16 \sin^2(\pi t) \, dt.

' "&chr(10)&"      2. Simplify using sin?2(x)=

'

   Selection.Copy

End Sub

Sub Macro88()

'

' Macro88 Macro

'

' "&chr(10)&"      3. Solve:

' "&chr(10)&"

' "&chr(10)&"      ?021 dt=2,?02cos?(2pt) dt=0.\int_0^2 1 \, dt = 2, \quad \int_0^2 \cos(2\pi t) \, dt = 0.

' "&chr(10)&"      Thus:

' "&chr(10)&"

' "&chr(10)&"      E=40·2=80 J.E

'

   Selection.Copy

End Sub

Sub Macro89()

'

' Macro89 Macro

' dVdt=IC,where I=VR.\frac{dV}{dt} = \frac{I}{C}, \quad \text{where } I = \frac{V}{R}.

' "&chr(10)&"      Example: For V(t)=50exp?(-t/RC) VV(t) = 50 \exp(-t/RC) \, \text{V}, calculate the rate of voltage drop at t=2 st = 2 \, \text{s} given R=10 OR = 1

'

   Selection.Copy

End Sub

Sub Macro90()
```

```
'
' Macro90 Macro
' 1. Differentiate V(t)V(t):
' "&chr(10)&"
' "&chr(10)&"      dVdt=ddt(50exp?(-t/(10·0.01)))=50·-10.1exp?(-t/0.1).\frac{dV}{dt} = \frac{d}{dt}
\left( 50 \exp(-t/(10 \cdot 0.01)) \right) = 50 \cdot -\frac{1}{0.1} \exp(-t/0.1).
'
   Selection.Copy
End Sub
Sub Macro91()
'
' Macro91 Macro
' Magnetic flux through a coil with NN turns is:
' "&chr(10)&"
' "&chr(10)&"      F=?B dA,\Phi = \int B \, dA,
' "&chr(10)&"      where BB is the magnetic field strength.
' "&chr(10)&"      Example: A uniform magnetic field B=0.02
'
   Selection.MoveDown Unit:=wdLine, Count:=22
   Selection.Copy
End Sub
Sub Macro92()
'
' Macro92 Macro
'
' "&chr(10)&"      A=0.1·0.1=0.01 m2.A = 0.1 \cdot 0.1 = 0.01 \, \text{m}^2.
' "&chr(10)&"      2. Flux:
' "&chr(10)&"
```

```
' "&chr(10)&"      F=B·A=0.02·0.01=2×10-4 Wb.\Phi = B \cdot A = 0.02 \cdot 0.01 = 2 \times 10^{-4} \, \text{Wb}.
'
    Selection.MoveDown Unit:=wdLine, Count:=27
    Selection.Copy
End Sub
Sub Macro93()
'
' Macro93 Macro
'
' "&chr(10)&"      Z=R2+(XL-XC)2,XL=2pfL,XC=12pfC.Z = \sqrt{R^2 + \left( X_L - X_C \right)^2}, \quad X_L = 2\pi f L, \quad X_C = \frac{1}{2\pi f C}.
' "&chr(10)&"      Example: Find dZdf\frac{dZ}{df} for R=50 OR = 50 \, \Omega, L=0.1 HL = 0.1 \
'
    Selection.MoveDown Unit:=wdLine, Count:=23
    ActiveWindow.ActivePane.VerticalPercentScrolled = -124
    Selection.Copy
End Sub
Sub Macro94()
'
' Macro94 Macro
'
' "&chr(10)&"      Vout(t)=RC·dVindt=(1×103·10×10-6)·10·2pcos?(2pt).V_{out}(t) = RC \cdot \frac{dV_{in}}{dt} = (1 \times 10^3 \cdot 10 \times 10^{-6}) \cdot 10 \cdot 2\pi \cos(2\pi t).
' "&chr(10)&"
' "&chr(10)&"      Vout(t)=0.2pcos?(2pt) V.V_{o
'
    Selection.MoveDown Unit:=wdLine, Count:=19
    Selection.Copy
End Sub
```

```
Sub Macro95()
'
' Macro95 Macro
' Vout(t)=1RC?Vin(t) dt.V_{out}(t) = \frac{1}{RC} \int V_{in}(t) \, dt.
' "&chr(10)&"      Example: For Vin(t)=5t VV_{in}(t) = 5t \, \text{V}, find Vout(t)V_{out}(t) with R=2 kOR = 2 \, \text{k}\Omega, C=100 µFC = 100 \, \mu\text{F}.
'
   Selection.Copy
End Sub
Sub Macro96()
'
' Macro96 Macro
'
' "&chr(10)&"      1. Integrate VinV_{in}:
' "&chr(10)&"
' "&chr(10)&"      ?Vin(t) dt=?5t dt=5t22.\int V_{in}(t) \, dt = \int 5t \, dt = \frac{5t^2}{2}.
' "&chr(10)&"      2. Calculate Vout(t)V_{out}(t):
' "&chr(10)&"
'
   Selection.MoveDown Unit:=wdLine, Count:=23
   Selection.Copy
End Sub
Sub Macro97()
'
' Macro97 Macro
' Rs=Vsupply-VzenerIzener.R_s = \frac{V_{supply} - V_{zener}}{I_{zener}}.
' "&chr(10)&"      Power Dissipation in the Zener:
' "&chr(10)&"
' "&chr(10)&"      P=Vzener·Izener.P = V_{zener} \cdot I_{zener}.
```

```
' "&chr(10)&"      Example
'
   Selection.Copy
End Sub
Sub Macro98()
'
' Macro98 Macro
'
' "&chr(10)&"      1. Series Resistance:
' "&chr(10)&"
' "&chr(10)&"      Rs=15-5.60.05=188 O.R_s = \frac{15 - 5.6}{0.05} = 188 \, \Omega.
' "&chr(10)&"      2. Power Dissipation:
' "&chr(10)&"
' "&chr(10)&"      P=5.6·0.
'
   Selection.MoveDown Unit:=wdLine, Count:=28
   Selection.Copy
End Sub
Sub Macro99()
'
' Macro99 Macro
'   f0=12pLC.f_0 = \frac{1}{2\pi\sqrt{LC}}.
' "&chr(10)&"      Example: For L=5 mHL = 5 \, \text{mH} and C=200 µFC = 200 \, \mu\text{F}, calculate f0f_0:
' "&chr(10)&"
' "&chr(10)&"      f0=12p5×10-3·200×10-6.f_0 = \frac{1}{2\pi\sqrt{5 \
'
   Selection.MoveDown Unit:=wdLine, Count:=83
   Selection.Copy
```

```
End Sub
Sub Macro100()
'
' Macro100 Macro
'
' "&chr(10)&"      Calculate the rate of change of input voltage dVdt\frac{dV}{dt}, capacitance (CC), resistance (RR), and time constant for an RC integrator given:
' "&chr(10)&"      · R=2 kOR = 2 \, \text{k}\Omega,
' "&chr(10)&"      · C=50 µFC = 5
'
   Selection.Copy
End Sub
Sub Macro101()
'
' Macro101 Macro
' 1. Time Constant:
' "&chr(10)&"
' "&chr(10)&"      t=RC=2×103·50×10-6=0.1 s.\tau = RC = 2 \times 10^3 \cdot 50 \times 10^{-6} = 0.1 \, \text{s}.
' "&chr(10)&"      2. Rate of Change:
' "&chr(10)&"
' "&chr(10)&"      dV
'
   Selection.Copy
End Sub
Sub Macro102()
'
' Macro102 Macro
'
```

```
' "&chr(10)&"      Calculation Example: If R=100 OR = 100 \, \Omega, L=0.1 HL = 0.1 \, \text{H}, and
Vin(t)=20sin?(10t)V_{in}(t) = 20 \sin(10t), calculate:

' "&chr(10)&"      1. Time Constant:

' "&chr(10)&"

' "&chr(10)&"      t=LR=0.1100=0.0

'

   Selection.MoveDown Unit:=wdLine, Count:=29

   Selection.Copy

End Sub

Sub Macro103()

'

' Macro103 Macro

' Analysis Using Complex Numbers:

' "&chr(10)&"      In an RLC circuit:

' "&chr(10)&"      1. Impedance:

' "&chr(10)&"

' "&chr(10)&"      Z=R+j(XL-XC),XL=?L,XC=1?C.Z = R + j(X_L - X_C), \quad X_L = \omega L, \quad X_C =
\frac{1}{\o

'

   Selection.Copy

End Sub

Sub Macro104()

'

' Macro104 Macro

'   Z=R+j(XL-XC),XL=?L,XC=1?C.Z = R + j(X_L - X_C), \quad X_L = \omega L, \quad X_C = \frac{1}{\omega C}.

' "&chr(10)&"      2. Power Factor:

' "&chr(10)&"

' "&chr(10)&"      cos??=R|Z|.\cos\phi = \frac{R}{|Z|}.

' "&chr(10)&"      E
```

```
'
    Selection.Copy
End Sub
Sub Macro105()
'
' Macro105 Macro
'
' "&chr(10)&"      Example:
' "&chr(10)&"      For R=10 OR = 10 \, \Omega, L=0.05 HL = 0.05 \, \text{H}, C=20 µFC = 20 \, \mu\text{F}, and f=1 kHzf = 1 \, \text{kHz}:
' "&chr(10)&"      1. Calculate XLX_L and XCX_C:
' "&chr(10)&"
'
    Selection.Copy
End Sub
Sub Macro106()
'
' Macro106 Macro
'
' "&chr(10)&"      Z=R2+(XL-XC)2=102+(314-8)2˜306 O.Z = \sqrt{R^2 + (X_L - X_C)^2} = \sqrt{10^2 + (314 - 8)^2} \approx 306 \, \Omega.
' "&chr(10)&"      Resonance in RLC Circuits
' "&chr(10)&"      Key Formulas:
' "&chr(10)&"      1. Resonance Fr
'
    ActiveWindow.ActivePane.VerticalPercentScrolled = -147
    Selection.MoveDown Unit:=wdLine, Count:=1
    Selection.Copy
End Sub
```

```
Sub Macro107()
'
' Macro107 Macro
' Industrial Electronics N4 syllabus focuses on building a strong foundation in electrical and electronic principles through key modules like Network Theorems, Alternating Current Theory, Electronic Power Control, and others. Here's a breakdown of the core
'
    Selection.MoveDown Unit:=wdLine, Count:=31
    Selection.Copy
End Sub
Sub Macro108()
'
' Macro108 Macro
'
' "&chr(10)&"      ?Iin=?Iout.\sum I_{\text{in}} = \sum I_{\text{out}}.
' "&chr(10)&"      2. Second Law (Voltage Law):
' "&chr(10)&"      o The sum of voltage drops in a closed loop equals the sum of EMFs:
' "&chr(10)&"
'
    Selection.Copy
End Sub
Sub Macro109()
'
' Macro109 Macro
'
' "&chr(10)&"      ?V=0.\sum V = 0.
' "&chr(10)&"      Example: For a loop with V1=10 VV_1 = 10 \, \text{V}, R1=2 OR_1 = 2 \, \Omega, and R2=3 OR_2 = 3 \, \Omega:
' "&chr(10)&"      1. Apply Kirchhoff’s Voltage Law:
' "&chr(10)&"
```

```
'
    Selection.MoveDown Unit:=wdLine, Count:=20
    Selection.Copy
End Sub
Sub Macro110()
'
' Macro110 Macro
' o Any linear circuit can be simplified to a single voltage source (VthV_{th}) and a series resistance (RthR_{th}).
' "&chr(10)&"      2. Steps:
' "&chr(10)&"      o Remove the load.
' "&chr(10)&"      o Calculate VthV_{th} across the open t
'
    Selection.Copy
End Sub
Sub Macro111()
'
' Macro111 Macro
' o Determine RthR_{th} by deactivating all sources (replace voltage sources with short circuits and current sources with open circuits).
' "&chr(10)&"      Example: For a circuit with Vs=12 VV_s = 12 \, \text{V}, R1=4 OR_1 = 4 \, \Omega, and R2=6 OR_2
'
    Selection.MoveDown Unit:=wdLine, Count:=33
    Selection.Copy
End Sub
Sub Macro112()
'
' Macro112 Macro
```

```
' Example: For Rth=10 OR_{th} = 10 \, \Omega, calculate maximum power if Vth=20 VV_{th} = 20 \, \text{V}:

' "&chr(10)&"

' "&chr(10)&"      Pmax=Vth24Rth=2024·10=10 W.P_{\text{max}} = \frac{V_{th}^2}{4R_{th}} = \frac{20^2}{4 \cdot 10} = 10 \,

'

   Selection.Copy

End Sub

Sub Macro113()

'

' Macro113 Macro

'

' "&chr(10)&"      Z=R+j(XL-XC),XL=?L,XC=1?C.Z = R + j(X_L - X_C), \quad X_L = \omega L, \quad X_C = \frac{1}{\omega C}.

' "&chr(10)&"      · Parallel Circuit:

' "&chr(10)&"

' "&chr(10)&"      1Z=1R2+(1XC-1XL)2.\frac{1}{Z} = \sqrt{\frac{1}{R

'

   Selection.Copy

End Sub

Sub Macro114()

'

' Macro114 Macro

' Example: For R=10 OR = 10 \, \Omega, L=0.1 HL = 0.1 \, \text{H}, C=10 µFC = 10 \, \mu\text{F}, and f=50 Hzf = 50 \, \text{Hz}:

' "&chr(10)&"      1. Inductive Reactance:

' "&chr(10)&"

' "&chr(10)&"      XL=2pfL=2p·50·0.1=31.4 O.X_L =

'

   Selection.MoveDown Unit:=wdLine, Count:=38
```

```
    Selection.Copy
End Sub
Sub Macro115()
'
' Macro115 Macro
' 2. Bandwidth:
' "&chr(10)&"
' "&chr(10)&"      BW=frQ,Q=?rLR.BW = \frac{f_r}{Q}, \quad Q = \frac{\omega_r L}{R}.
' "&chr(10)&"      Example: For L=0.5 HL = 0.5 \, \text{H}, C=20 µFC = 20 \, \mu\text{F}, and R=10 OR = 10 \, \Omega:
'
    Selection.Copy
End Sub
Sub Macro116()
'
' Macro116 Macro
'
' "&chr(10)&"
' "&chr(10)&"      fr=12p0.5·20×10-6˜50.33 Hz.f_r = \frac{1}{2\pi\sqrt{0.5 \cdot 20 \times 10^{-6}}} \approx 50.33 \, \text{Hz}.
' "&chr(10)&"      2. Quality Factor:
' "&chr(10)&"
' "&chr(10)&"      Q=?rLR=2p·50
'
    Selection.MoveDown Unit:=wdLine, Count:=59
    Selection.Copy
End Sub
Sub Macro117()
'
```

```
' Macro117 Macro
'
' "&chr(10)&"      3.1 Semiconductor Diode
' "&chr(10)&"      1. Diode Equation:
' "&chr(10)&"      o Forward current:
' "&chr(10)&"
' "&chr(10)&"      I=Is·(eqVkT-1),I = I_s \cdot \left(e^{\frac{qV}{kT}} - 1\right),
' "&chr(10)&"      whe
'
   Selection.Copy
End Sub
Sub Macro118()
'
' Macro118 Macro
'
' "&chr(10)&"      Example Calculation: Given Is=10-12 AI_s = 10^{-12} \, \text{A}, V=0.7 VV = 0.7 \,
\text{V}, T=300 KT = 300 \, \text{K}:
' "&chr(10)&"      1. Compute:
' "&chr(10)&"
' "&chr(10)&"      I=10-12·(e1.6×10-19·0.71.38×10-23·30
'
   Selection.Copy
End Sub
Sub Macro119()
'
' Macro119 Macro
'
' "&chr(10)&"      I=10-12·(e1.6×10-19·0.71.38×10-23·300-1).I = 10^{-12} \cdot \left(e^{\frac{1.6 \times
10^{-19} \cdot 0.7}{1.38 \times 10^{-23} \cdot 300}} - 1\right).
```

```
' "&chr(10)&"      2. Result:
' "&chr(10)&"
' "&chr(10)&"      I˜0.001
'
   Selection.MoveDown Unit:=wdLine, Count:=20
   Selection.Copy
End Sub
Sub Macro120()
'
' Macro120 Macro
' 3.2 Electronic Power Control Devices
' "&chr(10)&"      · SCR (Silicon Controlled Rectifier):
' "&chr(10)&"      o Conducts when triggered by a gate signal, and blocks when reversed.
' "&chr(10)&"      · DIAC:
' "&chr(10)&"      o Bidi
'
   Selection.MoveDown Unit:=wdLine, Count:=35
End Sub
Sub Macro121()
'
' Macro121 Macro
' Transformer Ratios:
' "&chr(10)&"      · Voltage Ratio:
' "&chr(10)&"
' "&chr(10)&"      Vs=Vp·NsNp.V_s = V_p \cdot \frac{N_s}{N_p}.
' "&chr(10)&"      · Current Ratio:
' "&chr(10)&"
' "&chr(10)&"      Is=Ip·NpNs.
'
```

```
    Selection.Copy
End Sub
Sub Macro122()
'
' Macro122 Macro
'
' "&chr(10)&"      Is=Ip·NpNs.I_s = I_p \cdot \frac{N_p}{N_s}.
' "&chr(10)&"      Example Calculation: Given Np=300N_p = 300, Ns=100N_s = 100, and Vp=240 V RMSV_p = 240 \, \text{V RMS}:
' "&chr(10)&"      1. Secondary Voltage:
' "&chr(10)&"
'
    Selection.Copy
End Sub
Sub Macro123()
'
' Macro123 Macro
'      RF=(VACVDC)2-1.RF = \sqrt{\left(\frac{V_{AC}}{V_{DC}}\right)^2 - 1}.
' "&chr(10)&"      2. Full-Wave Rectifier:
' "&chr(10)&"      o Utilizes both cycles, reducing ripple.
' "&chr(10)&"      Efficiency:
' "&chr(10)&"
'
    Selection.Copy
End Sub
Sub Macro124()
'
' Macro124 Macro
'
```

```
' "&chr(10)&"
' "&chr(10)&"      ?=PDCPAC.\eta = \frac{P_{DC}}{P_{AC}}.
' "&chr(10)&"      Module 5: Amplifiers
' "&chr(10)&"      Transistor Amplifier Configurations
' "&chr(10)&"      1. Common Emitter (CE):
' "&chr(10)&"
'
   Selection.Copy
End Sub
Sub Macro125()
'
' Macro125 Macro
'
' "&chr(10)&"      1. AM Signal Equation:
' "&chr(10)&"
' "&chr(10)&"      m(t)=Ac(1+macos??mt)cos??ct,m(t) = A_c(1 + m_a \cos \omega_m t) \cos \omega_c t,
' "&chr(10)&"      where mam_a: modulation index, AcA_c: carrier amplitude, ?c\ome
'
   Selection.Copy
End Sub
Sub Macro126()
'
' Macro126 Macro
'
' "&chr(10)&"      2. FM Signal Equation:
' "&chr(10)&"
' "&chr(10)&"      f(t)=cos?(?ct+ßsin??mt),f(t) = \cos (\omega_c t + \beta \sin \omega_m t),
' "&chr(10)&"      where ß\beta: modulation index.
'
```

```
   Selection.Copy
End Sub
Sub Macro127()
'
' Macro127 Macro
' · Demodulation:
' "&chr(10)&"      o Reverse process to recover original information from modulated signals.
' "&chr(10)&"      o Methods include envelope detection (AM) and phase-lock loops (FM).
' "&chr(10)&"      2. Antenna Systems
'
   Selection.MoveDown Unit:=wdLine, Count:=89
   Selection.Copy
End Sub
Sub Macro128()
'
' Macro128 Macro
' Advanced Calculations in Signal Modulation
' "&chr(10)&"      1. Amplitude Modulation (AM):
' "&chr(10)&"      The transmitted AM signal is given by:
' "&chr(10)&"
' "&chr(10)&"      m(t)=Ac[1+macos?(?mt)]cos?(?ct),m(t) = A_c [1
'
   Selection.MoveDown Unit:=wdLine, Count:=27
   Selection.Copy
End Sub
Sub Macro129()
'
' Macro129 Macro
'
```

```
' "&chr(10)&"      · mam_a: Modulation index, calculated as ma=AmAcm_a = \frac{A_m}{A_c},

' "&chr(10)&"      · ?c=2pfc\omega_c = 2\pi f_c: Carrier angular frequency,

' "&chr(10)&"      · ?m=2pfm\omega_m = 2\pi f_m: Message angular frequency.

'

   Selection.Copy

End Sub

Sub Macro130()

'

' Macro130 Macro

'

' "&chr(10)&"      Example Calculation: For Ac=5 VA_c = 5 \, \text{V}, Am=2 VA_m = 2 \, \text{V}, fc=100 kHzf_c = 100 \, \text{kHz}, fm=1 kHzf_m = 1 \, \text{kHz}:

' "&chr(10)&"      1. Modulation Index:

' "&chr(10)&"

' "&chr(10)&"      ma=AmAc=25

'

   Selection.Copy

End Sub

Sub Macro131()

'

' Macro131 Macro

' 2. AM Signal Equation:

' "&chr(10)&"

' "&chr(10)&"      m(t)=5[1+0.4cos?(2p·1000t)]cos?(2p·100000t).m(t) = 5 [1 + 0.4 \cos(2\pi \cdot 1000 t)] \cos(2\pi \cdot 100000 t).

' "&chr(10)&"      2. Frequency Modulation (FM):

'

   Selection.Copy

End Sub
```

```
Sub Macro132()
'
' Macro132 Macro
'
' "&chr(10)&"      Example Calculation: For ?f=5 kHz\Delta f = 5 \, \text{kHz}, fm=1 kHzf_m = 1 \, \text{kHz}, and Ac=10 VA_c = 10 \, \text{V}:
' "&chr(10)&"      1. Modulation Index:
' "&chr(10)&"
' "&chr(10)&"      ß=?ffm=50001000=5.\b
'
    ActiveWindow.ActivePane.VerticalPercentScrolled = -173
    Selection.Copy
End Sub
Sub Macro133()
'
' Macro133 Macro
' o Testing electrical wiring.
' "&chr(10)&"      o Fault-finding in electrical machines.
' "&chr(10)&"      o Renewable energy system maintenance.
' "&chr(10)&"      5. Practical Career Applications
' "&chr(10)&"      · Learners apply s
'
    ActiveWindow.ActivePane.VerticalPercentScrolled = -173
    Selection.Copy
End Sub
Sub Macro134()
'
' Macro134 Macro
'
```

' "&chr(10)&" Key Role: Integrals help analyze energy storage, system behavior over time, and power distribution in circuits.

' "&chr(10)&" · Energy Stored in Capacitors: $$ E = \frac{1}{2} C V^2 $$ Example: For a capacitor with C=10μFC = 10 \m

'

  Selection.Copy

End Sub

Sub Macro135()

'

' Macro135 Macro

'

' "&chr(10)&" · Total Energy in a Time Period (AC Systems): Calculate energy consumption using: $$ E = \int P(t) \, dt $$. If P(t)=5sin?(2pt)P(t) = 5 \sin(2\pi t), solve: $$ E = \int_0^{1} 5 \sin(2\pi t) \, dt. $$

' "&chr(10)&" 2. Derivative Calc

'

  Selection.Copy

End Sub

Sub Macro136()

'

' Macro136 Macro

'

' "&chr(10)&" · Induced Voltage in Inductors: Voltage across an inductor is: $$ V(t) = L \frac{di(t)}{dt}. $$ Example: With L=5HL = 5H and i(t)=t2i(t) = t^2: $$ V(t) = 5 \times \frac{d(t^2)}{dt} = 10t. $$ At \(t = 2s, V(2) = 10 \times 2 = 20V. $$

'

  Selection.MoveDown Unit:=wdLine, Count:=102

  Selection.Copy

End Sub

Sub Macro137()

'

```
' Macro137 Macro
'
' "&chr(10)&"      · Resistance Testing:
' "&chr(10)&"      o Verifying earth resistance must ensure values below 2 O, calculated using Ohm's law: $$ R = \frac{V}{I} $$
' "&chr(10)&"      · Insulation Resistance:
' "&chr(10)&"      o This should exceed
'
End Sub
Sub Macro138()
'
' Macro138 Macro
'
' "&chr(10)&"      o Verifying earth resistance must ensure values below 2 O, calculated using Ohm's law: $$ R = \frac{V}{I} $$
' "&chr(10)&"      · Insulation Resistance:
' "&chr(10)&"      o This should exceed 1 MO, confirming isolation standards
'
   Selection.MoveDown Unit:=wdLine, Count:=57
End Sub
```

```
Private Sub Label1_Click()
End Sub
Private Sub Label4_Click()
End Sub
Private Sub Label5_Click()
End Sub
Private Sub Label6_Click()
End Sub
Private Sub Label7_Click()
End Sub
Private Sub Label8_Click()
End Sub
Private Sub Label9_Click()
End Sub
Private Sub ListBox1_Click()
End Sub
Private Sub MultiPage1_Change()
End Sub
Private Sub MultiPage2_Change()
End Sub
Private Sub ScrollBar1_Change()
End Sub
Private Sub SpinButton1_Change()
End Sub
Private Sub TabStrip1_Change()
End Sub
Private Sub TextBox1_Change()
End Sub
Private Sub TextBox10_Change()
End Sub
Private Sub TextBox12_Change()
End Sub
Private Sub TextBox14_Change()
End Sub
Private Sub TextBox15_Change()
End Sub
Private Sub TextBox16_Change()UserForm1 - 2
End Sub
Private Sub TextBox2_Change()
End Sub
Private Sub TextBox4_Change()
End Sub
Private Sub TextBox6_Change()
End Sub
Private Sub TextBox7_Change()
End Sub
Private Sub TextBox9_Change()
End Sub
Private Sub ToggleButton1_Click()
End Sub
Private Sub UserForm_Activate()
End Sub
Private Sub UserForm_AddControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean, ByVal Control As
MSForms
```

.Control, ByVal Action As MSForms.fmAction, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal Effect As MSForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub UserForm_Click()
End Sub
Private Sub UserForm_DblClick(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub UserForm_Error(ByVal Number As Integer, ByVal Description As MSForms.ReturnString, ByVal S Code As Long, ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, ByVal Cance lDisplay As MSForms.ReturnBoolean)
End Sub
Private Sub UserForm_Initialize()
End Sub
Private Sub UserForm_KeyUp(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub UserForm_MouseMove(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV al Y As Single)
End Sub
Private Sub UserForm_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal Y As Single)
End SubUserForm1 - 3
Private Sub UserForm_Resize()
End Sub
Private Sub UserForm_Scroll(ByVal ActionX As MSForms.fmScrollAction, ByVal ActionY As MSForms.fmScroll Action, ByVal RequestDx As Single, ByVal RequestDy As Single, ByVal ActualDx As MSForms.ReturnSingle, ByVal ActualDy As MSForms.ReturnSingle)
End Sub
Private Sub UserForm_Terminate()
End Subregister academic national trade module class subject course /enginering studie intelligence artificial , expercomputer register trade theory engineering artificial intelligent counter subject time tablrealt matter system
subject mathematic
subject electrical trade theory
subject industrial eletronics
subject engineering science
subject fault find
"txt_labell 2"=true
txt_labell 2"=true
txt_labell 2"=true
txt_labell 2"=true
txt_labell 2"=true
subject electrotechnology
subject control system
subject installer rules
subject electrotechnic
subject power machine
txt_labell 2"=true
txt_labell 2"=true
subject orientation industria ,
supervision ,
txt_labell 2"=true
subject manangement
system learner policy
txt_labell 2"=true
txt_labell 2"=true
subject learner total
assessment mark total , time
marksheet
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ok
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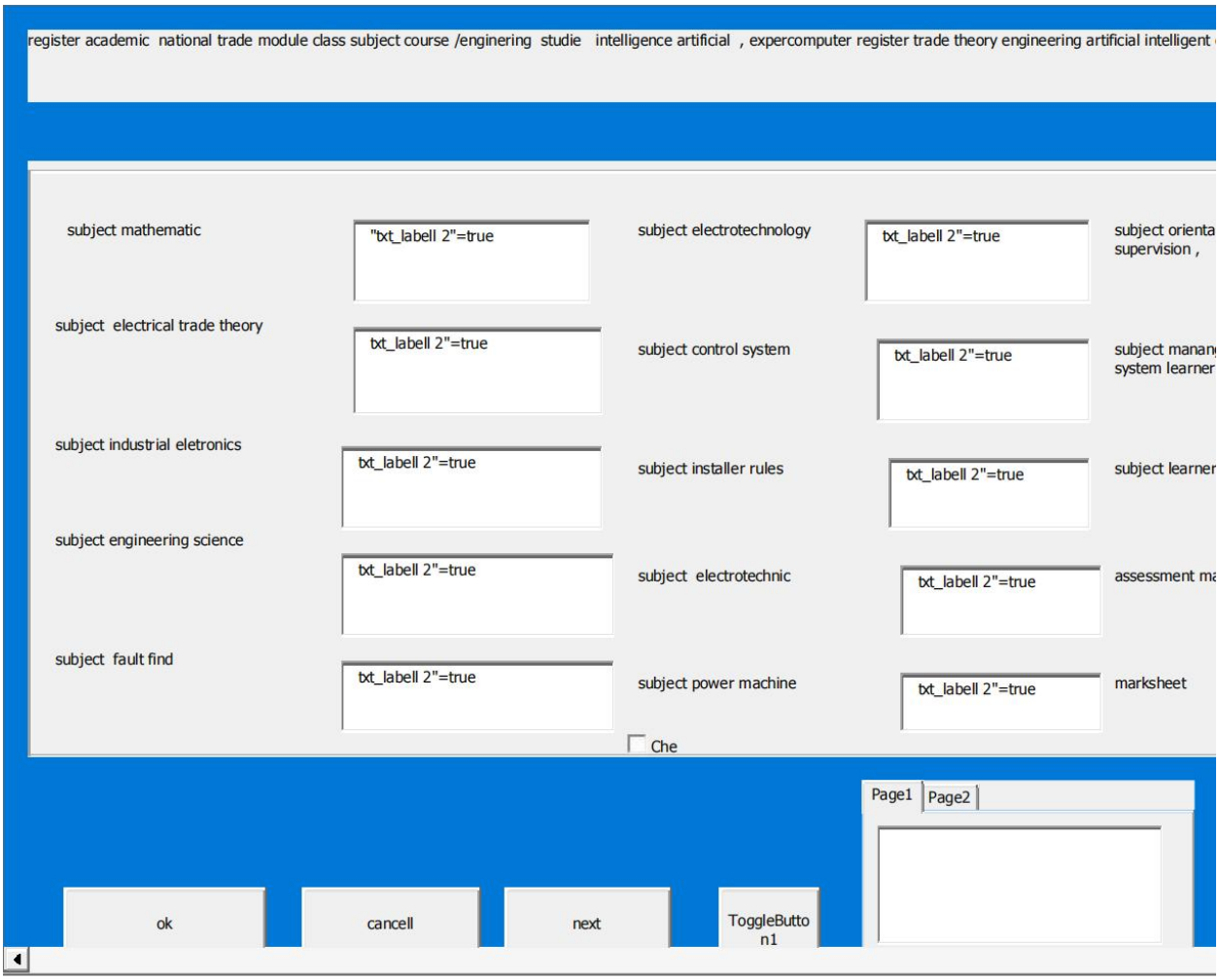
Page1 Page2
ToggleButto

n1




```
VERSION 5.00
Begin {C62A69F0-16DC-11CE-9E98-00AA00574A4F} UserForm1
   Caption         =   "UserForm1"
   ClientHeight    =   9792
   ClientLeft      =   108
   ClientTop       =   456
   ClientWidth     =   20004
   OleObjectBlob   =   "UserForm computer register trade theory engineering
artificial intelligent counter subject time tablreal.frx":0000
   StartUpPosition =   1  'CenterOwner
   WhatsThisButton =   -1  'True
   WhatsThisHelp   =   -1  'True
End
Attribute VB_Name = "UserForm1"
Attribute VB_GlobalNameSpace = False
Attribute VB_Creatable = False
Attribute VB_PredeclaredId = True
Attribute VB_Exposed = False
Private Sub Label1_Click()

End Sub
```

```
Private Sub Label4_Click()

End Sub

Private Sub Label5_Click()

End Sub

Private Sub Label6_Click()

End Sub

Private Sub Label7_Click()

End Sub

Private Sub Label8_Click()

End Sub

Private Sub Label9_Click()

End Sub

Private Sub ListBox1_Click()

End Sub

Private Sub MultiPage1_Change()

End Sub

Private Sub MultiPage2_Change()

End Sub

Private Sub ScrollBar1_Change()

End Sub

Private Sub SpinButton1_Change()

End Sub

Private Sub TabStrip1_Change()

End Sub

Private Sub TextBox1_Change()

End Sub

Private Sub TextBox10_Change()

End Sub
```

```
Private Sub TextBox12_Change()

End Sub

Private Sub TextBox14_Change()

End Sub

Private Sub TextBox15_Change()

End Sub

Private Sub TextBox16_Change()

End Sub

Private Sub TextBox2_Change()

End Sub

Private Sub TextBox4_Change()

End Sub

Private Sub TextBox6_Change()

End Sub

Private Sub TextBox7_Change()

End Sub

Private Sub TextBox9_Change()

End Sub

Private Sub ToggleButton1_Click()

End Sub

Private Sub UserForm_Activate()

End Sub

Private Sub UserForm_AddControl(ByVal Control As MSForms.Control)

End Sub

Private Sub UserForm_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean,
ByVal Control As MSForms.Control, ByVal Action As MSForms.fmAction, ByVal
Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal
Effect As MSForms.ReturnEffect, ByVal Shift As Integer)

End Sub

Private Sub UserForm_Click()
```

```
End Sub

Private Sub UserForm_DblClick(ByVal Cancel As MSForms.ReturnBoolean)

End Sub

Private Sub UserForm_Error(ByVal Number As Integer, ByVal Description As
MSForms.ReturnString, ByVal SCode As Long, ByVal Source As String, ByVal
HelpFile As String, ByVal HelpContext As Long, ByVal CancelDisplay As
MSForms.ReturnBoolean)

End Sub

Private Sub UserForm_Initialize()

End Sub

Private Sub UserForm_KeyUp(ByVal KeyCode As MSForms.ReturnInteger, ByVal
Shift As Integer)

End Sub

Private Sub UserForm_MouseMove(ByVal Button As Integer, ByVal Shift As
Integer, ByVal X As Single, ByVal Y As Single)

End Sub

Private Sub UserForm_MouseUp(ByVal Button As Integer, ByVal Shift As Integer,
ByVal X As Single, ByVal Y As Single)

End Sub

Private Sub UserForm_Resize()

End Sub

Private Sub UserForm_Scroll(ByVal ActionX As MSForms.fmScrollAction, ByVal
ActionY As MSForms.fmScrollAction, ByVal RequestDx As Single, ByVal RequestDy
As Single, ByVal ActualDx As MSForms.ReturnSingle, ByVal ActualDy As
MSForms.ReturnSingle)

End Sub

Private Sub UserForm_Terminate()

End Sub
```

```
Sub Macro2()
'
' Macro2 Macro
' current (I=dQdtI = \frac{dQ}{dt}), where the derivative of charge with respect to time gives the current.
' "&chr(10)&"      · Integral Function (?f(x,y)dx\int f(x, y) dx):
'
End Sub
Sub Macro3()
'
' Macro3 Macro
' · Integral Function (?f(x,y)dx\int f(x, y) dx):
'
End Sub
Sub Macro4()
'
' Macro4 Macro
' Calculating the total energy in a capacitor (W=?V dQW = \int V \, dQ) or the area under the voltage-time graph for evaluating work done.
'
End Sub
Sub Macro5()
'
' Macro5 Macro
' : $$W = \int_0^Q V \, dQ$$
' "&chr(10)&"      § Here, WW represents the energy stored, VV is voltage, and QQ is charge. Integration helps calculate the energy based on the charge distribution.
' "&chr(10)&"      o Inductors: $$V = L \frac{dI}{dt
'
End Sub
```

```
Sub Macro6()
'
' Macro6 Macro
' Rate of Change in Current: $$I = \frac{dQ}{dt}$$
' "&chr(10)&"      § This derivative links the charge flowing through a conductor over time to the current.
' "&chr(10)&"      o Voltage in Changing Magnetic Fields (Faraday's Law): $$\mathcal{E}
'
End Sub
Sub Macro7()
'
' Macro7 Macro
' 1. Junior-Level Focus:
' "&chr(10)&"      o Electrical Trade Theory (N1-N3):
' "&chr(10)&"      § Covers foundational concepts like safety precautions, DC theory, conductors, and wiring systems.
' "&chr(10)&"      § Practical applications i
'
End Sub
Sub Macro8()
'
' Macro8 Macro
' 1. Voltage Across a Capacitor: $$V(t) = \frac{1}{C} \int i(t) \, dt + V_0$$
' "&chr(10)&"      o Application: Determines voltage V(t)V(t) across a capacitor, where i(t)i(t) is the current, CC is capacitance, and V0V_0 is the initial voltage.
'
End Sub
Sub Macro9()
'
' Macro9 Macro
```

```
' 2. Total Energy Stored in an Inductor: $$E = \frac{1}{2} L \int i^2(t) \, dt$$

' "&chr(10)&"      o Application: Calculates energy in an inductor, where LL is inductance and i(t)i(t) is current.

'



'

End Sub

Sub Macro10()

'

' Macro10 Macro

' 3. Charge in a Circuit: $$Q = \int I(t) \, dt$$

' "&chr(10)&"      o Application: Finds the total electric charge QQ flowing through a circuit over time, based on current I(t)I(t).

'

End Sub

Sub Macro11()

'

' Macro11 Macro

' 1. Current in a Capacitor: $$I(t) = C \frac{dV(t)}{dt}$$

' "&chr(10)&"      o Application: Relates the rate of change of voltage to the current flowing through a capacitor.

' "&chr(10)&"      2. Electromotive Force (Faraday's Law): $$\mathcal{E}

'

End Sub

Sub Macro12()

'

' Macro12 Macro

' Circuit Analysis:

' "&chr(10)&"      o Use integrals and derivatives to analyze RLC circuits and measure power dissipation.

' "&chr(10)&"      · Measuring Instruments:
```

```
' "&chr(10)&"      o Apply calculus to calibrate and interpret readings
'
End Sub
Sub Macro13()
'
' Macro13 Macro
' Circuit Analysis:
' "&chr(10)&"      o Use integrals and derivatives to analyze RLC circuits and measure power dissipation.
' "&chr(10)&"      · Measuring Instruments:
' "&chr(10)&"      o Apply calculus to calibrate and interpret readings
'
End Sub
Sub Macro14()
'
' Macro14 Macro
' 1. Junior-Level Roles: Maintenance technician, soldering specialist, or assistant in electrical installations.
' "&chr(10)&"      2. Senior-Level Roles: Electrical engineer, system designer, or project manager overseeing large-scale installations and
'
End Sub
Sub Macro1()
'
' Macro1 Macro
' · Derivative Function (f'(x, y)):
' "&chr(10)&"      o Derivatives measure the rate of change of a function, essential for analyzing varying electrical quantities like current (I), voltage (V), and resistance (R).
' "&chr(10)&"      o Example in
'
```

```
End Sub
Sub Macro15()
'
' Macro15 Macro
' ?f(x)g'(x)dx=f(x)g(x)-?g(x)f'(x)dx.\int f(x) g'(x) dx = f(x) g(x) - \int g(x) f'(x) dx.
' "&chr(10)&"      · Example: Integrate ?xexdx\int x e^x dx:
' "&chr(10)&"      1. Set f(x)=xf(x) = x and g'(x)=exg'(x) = e^x.
'
End Sub
Sub Macro16()
'
' Macro16 Macro
'
' "&chr(10)&"      f'(x)=1,g(x)=ex.f'(x) = 1, \quad g(x) = e^x.
' "&chr(10)&"      3. Apply the formula:
' "&chr(10)&"
' "&chr(10)&"      ?xexdx=xex-?exdx=xex-ex+C.\int x e^x dx = x e^x - \int e^x dx = x e^x - e^x + C.
'
   Selection.MoveDown Unit:=wdLine, Count:=19
End Sub
Sub Macro17()
'
' Macro17 Macro
'
' "&chr(10)&"      f'(x)=1,g(x)=ex.f'(x) = 1, \quad g(x) = e^x.
' "&chr(10)&"      3. Apply the formula:
' "&chr(10)&"
' "&chr(10)&"      ?xexdx=xex-?exdx=xex-ex+C.\int x e^x dx = x e^x - \int e^x dx = x e^x - e^x + C.
'
```

```
End Sub
Sub Macro18()
'
' Macro18 Macro
'
' "&chr(10)&"      ?sin?2(x)dx=?12dx-?cos?(2x)2dx=x2-sin?(2x)4+C.\int \sin^2(x) dx = \int \frac{1}{2} dx - \int \frac{\cos(2x)}{2} dx = \frac{x}{2} - \frac{\sin(2x)}{4} + C.
' "&chr(10)&"      3. Completing the Square:
' "&chr(10)&"      o Transform qu
'
End Sub
Sub Macro19()
'
' Macro19 Macro
'
' "&chr(10)&"      o Example: Integrate ?1x2+6x+10dx\int \frac{1}{x^2 + 6x + 10} dx.
' "&chr(10)&"      § Complete the square: x2+6x+10=(x+3)2+1x^2 + 6x + 10 = (x + 3)^2 + 1.
' "&chr(10)&"      § Use the formula for inverse tangent:
' "&chr(10)&"
'
End Sub
Sub Macro20()
'
' Macro20 Macro
'
' "&chr(10)&"      2(x+3)3?Ax+3+B(x+3)2+C(x+3)3.\frac{2}{(x+3)^3} \to \frac{A}{x+3} + \frac{B}{(x+3)^2} + \frac{C}{(x+3)^3}.
' "&chr(10)&"      · Case 2: Two Recursive Factors:
' "&chr(10)&"
```

```
' "&chr(10)&"      5x(x-1)2(2x-5)?A(x-1)+B(x-1)2+C
'
End Sub
Sub Macro21()
'
' Macro21 Macro
' 5x(x-1)2(2x-5)?A(x-1)+B(x-1)2+C(2x-5).\frac{5x}{(x-1)^2 (2x-5)} \to \frac{A}{(x-1)} + \frac{B}{(x-1)^2} +
\frac{C}{(2x-5)}.
'
End Sub
Sub Macro22()
'
' Macro22 Macro
' 5x(x-1)2(2x-5)?A(x-1)+B(x-1)2+C(2x-5).\frac{5x}{(x-1)^2 (2x-5)} \to \frac{A}{(x-1)} + \frac{B}{(x-1)^2} +
\frac{C}{(2x-5)}.
'
End Sub
Sub Macro23()
'
' Macro23 Macro
'
' "&chr(10)&"      A=?01[(x+2)-x2]dx=?01(-x2+x+2)dx.A = \int_0^1 [(x+2) - x^2] dx = \int_0^1 (-x^2 + x + 2)
dx.
' "&chr(10)&"      Compute:
' "&chr(10)&"
' "&chr(10)&"      ?01(-x2+x+2)dx=[-x33+x22+2x]01=-13+12+2=136.\int_0^1 (-x^2 + x + 2)
'
End Sub
Sub Macro24()
'
```

```
' Macro24 Macro
'
' "&chr(10)&"      V=p?ab[f(x)]2dx.V = \pi \int_a^b [f(x)]^2 dx.
' "&chr(10)&"      · Shell Method:
' "&chr(10)&"
' "&chr(10)&"      V=2p?abxf(x)dx.V = 2\pi \int_a^b x f(x) dx.
'


'
End Sub
Sub Macro25()
'
' Macro25 Macro
' 1. Formula:
' "&chr(10)&"      \[ V = \pi \int_0^1 (x2)2 dx = \pi \int_0^1 x^4 dx. \]
' "&chr(10)&"      2. Compute:
' "&chr(10)&"      \[ V = \pi \left[\frac{x5}{5}\right]_01 = \frac{\pi}{5}. \]
'
End Sub
Sub Macro26()
'
' Macro26 Macro
' x2=4-x2  ?  2x2=4  ?  x=±2.x^2 = 4 - x^2 \implies 2x^2 = 4 \implies x = \pm\sqrt{2}.
' "&chr(10)&"      Intersection points are (2,2)(\sqrt{2}, 2) and (-2,2)(-\sqrt{2}, 2).
'
End Sub
Sub Macro27()
'
' Macro27 Macro
```

```
'

' "&chr(10)&"      A=?-22[(4-x2)-x2]dx=?-22(4-2x2)dx.A = \int_{-\sqrt{2}}^{\sqrt{2}} [(4 - x^2) - x^2] dx =
\int_{-\sqrt{2}}^{\sqrt{2}} (4 - 2x^2) dx.

' "&chr(10)&"      Compute:

' "&chr(10)&"      \[ A = [4x - \frac{2x3}{3}]_{-\sqrt{2}}{\

'

End Sub

Sub Macro28()

'

' Macro28 Macro

'

' "&chr(10)&"      x¯=?abx[f(x)-g(x)]dx?ab[f(x)-g(x)]dx.\bar{x} = \frac{\int_a^b x [f(x) - g(x)] dx}{\int_a^b
[f(x) - g(x)] dx}.

' "&chr(10)&"      · Example: For y=x2y = x^2, find x¯\bar{x} over [0,1][0, 1]:

' "&chr(10)&"

' "&chr(10)&"

'

End Sub

Sub Macro29()

Attribute Macro29.VB_Description = "Compute numerator:
\r\n
\r\n          ?01x3dx=x44|01=14.\\int_0^1 x^3 dx = \\frac{x^4}{4} \\big|_0^1 = \\frac{1}{4}.
\r\n          Compute denominator:
\r\n _

                    \r\n          ?01x2dx=x33|01=13."

'

' Macro29 Macro

' Compute numerator:

' "&chr(10)&"

' "&chr(10)&"      ?01x3dx=x44|01=14.\int_0^1 x^3 dx = \frac{x^4}{4} \big|_0^1 = \frac{1}{4}.

' "&chr(10)&"      Compute denominator:
```

```
' "&chr(10)&"

' "&chr(10)&"      ?01x2dx=x33|01=13.

'

End Sub

Sub Macro30()

Attribute Macro30.VB_Description = "                                        \r\n          Ix=?ab[f(x)]2dx.I_x =
\\int_a^b [f(x)]^2 dx.
\r\n          2. Moment of Inertia:
\r\n          o For solids:
\r\n
\r\n          I=?abx2[f(x)]dx.I = \\int_a^b x^2 [f(x)] dx. _

                                                                    \r\n"

'

' Macro30 Macro

'

' "&chr(10)&"      Ix=?ab[f(x)]2dx.I_x = \int_a^b [f(x)]^2 dx.

' "&chr(10)&"      2. Moment of Inertia:

' "&chr(10)&"      o For solids:

' "&chr(10)&"

' "&chr(10)&"      I=?abx2[f(x)]dx.I = \int_a^b x^2 [f(x)] dx.

'



'

End Sub

Sub Macro31()

'

' Macro31 Macro

' : Find the area between y=x2y = x^2 and y=4-x2y = 4 - x^2 over x=-2x = -\sqrt{2} to x=2x = \sqrt{2}:

' "&chr(10)&"

' "&chr(10)&"      A=?-22[(4-x2)-x2]dx=?-22(4-2x2)dx.A = \int_{-\sqrt{2}}^{\sqrt{2}} [(4 - x^2) - x^2] dx =
\int_{-\sqrt{2}}
```

```
'

End Sub

Sub Macro32()

'

' Macro32 Macro

' Polar form representation (modulus r=x2+y2r = \sqrt{x^2 + y^2} and argument ?=tan?-1(y/x)\theta = \tan^{-1}(y/x)) is crucial for simplifying multiplications and divisions.

'

End Sub

Sub Macro33()

'

' Macro33 Macro

' o Formula: D=ad-bcD = ad - bc.

' "&chr(10)&"      o Example Calculation: If D=[63-23]D = \begin{bmatrix} 6 & 3 \\ -2 & 3 \end{bmatrix}, then:

' "&chr(10)&"

' "&chr(10)&"      D=(6·3)-(3·-2)=18+6=24.D = (6 \cdot 3) - (3 \cdot -2) = 18

'

   Selection.MoveDown Unit:=wdLine, Count:=22

End Sub

Sub Macro34()

'

' Macro34 Macro

' D=[abcdefghi],D = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix},

' "&chr(10)&"      the determinant is:

' "&chr(10)&"

' "&chr(10)&"      D=a(ei-fh)-b(di-fg)+c(dh-eg).D = a(ei - fh) - b(di - fg) + c(dh - eg).

'

End Sub
```

```
Sub Macro35()
'
' Macro35 Macro
' D=[abcdefghi],D = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix},
' "&chr(10)&"      the determinant is:
' "&chr(10)&"
' "&chr(10)&"      D=a(ei-fh)-b(di-fg)+c(dh-eg).D = a(ei - fh) - b(di - fg) + c(dh - eg).
'
End Sub
Sub Macro36()
'
' Macro36 Macro
'
' "&chr(10)&"      o Using conjugates, divide (3+2i)(3 + 2i) by (1-i)(1 - i): Multiply numerator and denominator by (1+i)(1 + i):
' "&chr(10)&"      \[ \frac{(3+2i)}{(1-i)} = \frac{(3+2i)(1+i)}{(1-i)(1+i)} = \frac{3+3i+2i+2i2}{1+12} = \frac{1+5i}{2}. \]
'
End Sub
Sub Macro37()
'
' Macro37 Macro
'
' "&chr(10)&"      o Convert z=3+4iz = 3 + 4i: Modulus: r=32+42=5r = \sqrt{3^2 + 4^2} = 5. Argument: ?=tan?-1(43)˜53.1°\theta = \tan^{-1}(\frac{4}{3}) \approx 53.1^\circ. Polar Form: z=5(cos?53.1°+isin?53.1°)z = 5(\cos 53.1^\circ + i\sin 53.1^\circ).
'
   Selection.MoveDown Unit:=wdLine, Count:=132
   Selection.MoveUp Unit:=wdLine, Count:=36
End Sub
```

```
Sub Macro38()
'
' Macro38 Macro
'
' "&chr(10)&"      o Convert z=3+4iz = 3 + 4i: Modulus: r=32+42=5r = \sqrt{3^2 + 4^2} = 5.
Argument: ?=tan?-1(43)˜53.1°\theta = \tan^{-1}(\frac{4}{3}) \approx 53.1^\circ. Polar Form:
z=5(cos?53.1°+isin?53.1°)z = 5(\cos 53.1^\circ + i\sin 53.1^\circ).
'
End Sub
Sub Macro39()
'
' Macro39 Macro
' o x3?3x2x^3 \to 3x^2, 5x2?10x5x^2 \to 10x, -x?-1-x \to -1, 7?07 \to 0.
' "&chr(10)&"      2. Result: dydx=3x2+10x-1\frac{dy}{dx} = 3x^2 + 10x - 1.
'



'
   Selection.MoveDown Unit:=wdLine, Count:=31
End Sub
Sub Macro40()
'
' Macro40 Macro
'
' "&chr(10)&"      (x+y)3=x3+3x2y+3xy2+y3.(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3.
' "&chr(10)&"      3. Differentiation from First Principles:
' "&chr(10)&"      o Define dydx\frac{dy}{dx} as:
' "&chr(10)&"
' "&chr(10)&"      lim?h?0f(x+
'
```

```
End Sub

Sub Macro41()

Attribute Macro41.VB_Description = "o Let u=2xu = 2x, then:
\r\n
\r\n        ddx[sin?(u)]=cos?(u)·dudx.\\frac{d}{dx}[\\sin(u)] = \\cos(u) \\cdot \\frac{du}{dx}.
\r\n        Substituting u=2xu = 2x:
\r\n _
                                \r\n        ddx[s"
'

' Macro41 Macro

' o Let u=2xu = 2x, then:

' "&chr(10)&"

' "&chr(10)&"    ddx[sin?(u)]=cos?(u)·dudx.\frac{d}{dx}[\sin(u)] = \cos(u) \cdot \frac{du}{dx}.

' "&chr(10)&"    Substituting u=2xu = 2x:

' "&chr(10)&"

' "&chr(10)&"    ddx[s
'

   Selection.MoveDown Unit:=wdLine, Count:=71

End Sub

Sub Macro42()
'

' Macro42 Macro

' o Integrate ?xndx\int x^n dx:

' "&chr(10)&"

' "&chr(10)&"    ?xndx=xn+1n+1+C(if n?-1).\int x^n dx = \frac{x^{n+1}}{n+1} + C \quad (\text{if } n \neq
-1).

' "&chr(10)&"    2. Trigonometric Integration:

' "&chr(10)&"    o Exa
'

   Selection.MoveDown Unit:=wdLine, Count:=150
```

```
End Sub

Sub Macro43()

'

' Macro43 Macro

'

' "&chr(10)&"      · Power Rule: If f(x)=xnf(x) = x^n, then f'(x)=n·xn-1f'(x) = n \cdot x^{n-1}. Example: f(x)=x3  ?  f'(x)=3x2f(x) = x^3 \implies f'(x) = 3x^2.

' "&chr(10)&"      · Constant Rule: If f(x)=cf(x) = c, where cc is constant, then f'(x)=0f'(x) = 0. Exam

'

End Sub

Sub Macro44()

'

' Macro44 Macro

' 2. Advanced Rules

' "&chr(10)&"      For more complex functions:

' "&chr(10)&"      · Product Rule: If f(x)=u(x)·v(x)f(x) = u(x) \cdot v(x), then f'(x)=u'(x)·v(x)+u(x)·v'(x)f'(x) = u'(x) \cdot v(x) + u(x) \cdot v'(x). Example: f(x)=x·sin?(x)  ?

'

End Sub

Sub Macro45()

'

' Macro45 Macro

' Real-World Example

' "&chr(10)&"      Let’s calculate the derivative of f(x)=3x2+5x+2f(x) = 3x^2 + 5x + 2, representing velocity in an engineering context:

' "&chr(10)&"      1. Differentiate each term:

' "&chr(10)&"      o 3x2  ?  6x3x^2 \

'

   Selection.MoveDown Unit:=wdLine, Count:=145

End Sub
```

```
Sub Macro46()
'
' Macro46 Macro
' o The limit describes the value a function approaches as the input gets close to a specific point. Notation: lim?x?af(x)\lim_{x \to a} f(x).
' "&chr(10)&"      o Example: Find lim?x?2(x2-4)\lim_{x \to 2} (x^2 - 4):
' "&chr(10)&"
'
End Sub
Sub Macro47()
'
' Macro47 Macro
'   o Forms like 00\frac{0}{0} are resolved by simplifying the function or applying L'Hôpital's rule (if allowed).
' "&chr(10)&"      4. Continuity
' "&chr(10)&"      1. Definition:
' "&chr(10)&"      o A function f(x)f(x) is continuous at x=a
'
End Sub
Sub Macro48()
'
' Macro48 Macro
'
' "&chr(10)&"
' "&chr(10)&"      x=-4±42-4(2)(-6)2(2)=-4±16+484=-4±644.x = \frac{-4 \pm \sqrt{4^2 - 4(2)(-6)}}{2(2)} = \frac{-4 \pm \sqrt{16 + 48}}{4} = \frac{-4 \pm \sqrt{64}}{4}.
' "&chr(10)&"      3. Simplify:
' "&chr(10)&"
'
End Sub
```

```
Sub Macro49()
'
' Macro49 Macro
'
' "&chr(10)&"      vr=vA2+vB2=402+302=1600+900=2500=50 km/h.v_r = \sqrt{v_A^2 + v_B^2} = \sqrt{40^2 + 30^2} = \sqrt{1600 + 900} = \sqrt{2500} = 50 \, \text{km/h}.
' "&chr(10)&"      2. Shortest Distance:
' "&chr(10)&"      o If both cars are moving tow
'
   Selection.MoveDown Unit:=wdLine, Count:=53
End Sub
Sub Macro50()
'
' Macro50 Macro
' A ball is projected horizontally from a height of 5 m5 \, \text{m} with an initial velocity of 10 m/s10 \, \text{m/s}. Calculate the time of flight and range:
' "&chr(10)&"      1. Time of Flight: Using h=12gt2h = \frac{1}{2} g t^2, solve:
'
End Sub
Sub Macro51()
'
' Macro51 Macro
'
' "&chr(10)&"      5=12·9.8·t2  ?  t=109.8˜1.01 s.5 = \frac{1}{2} \cdot 9.8 \cdot t^2 \implies t = \sqrt{\frac{10}{9.8}} \approx 1.01 \, \text{s}.
' "&chr(10)&"      2. Range: Horizontal distance: x=v·tx = v \cdot t:
' "&chr(10)&"
'
End Sub
Sub Macro52()
```

```
'

' Macro52 Macro

' A wheel rotates at 10 rad/s10 \, \text{rad/s} with an angular acceleration of 2 rad/s22 \, \text{rad/s}^2. Find the angular displacement after 5 s5 \, \text{s}:

' "&chr(10)&"      1. Use:

' "&chr(10)&"

' "&chr(10)&"      ?=?t+12at2.\t

'

   Selection.MoveDown Unit:=wdLine, Count:=26

End Sub

Sub Macro53()

'

' Macro53 Macro

' F=ma=1000·2=2000 N.F = ma = 1000 \cdot 2 = 2000 \, \text{N}.

'

   Selection.MoveDown Unit:=wdLine, Count:=35

End Sub

Sub Macro54()

'

' Macro54 Macro

' F=ma=1000·2=2000 N.F = ma = 1000 \cdot 2 = 2000 \, \text{N}.

'

   Selection.MoveDown Unit:=wdLine, Count:=27

End Sub

Sub Macro55()

'

' Macro55 Macro

' 1. Use F=P·AF = P \cdot A:

' "&chr(10)&"
```

```
' "&chr(10)&"      A=p·(0.52)2=0.196 m2,A = \pi \cdot \left(\frac{0.5}{2}\right)^2 = 0.196 \, \text{m}^2,

' "&chr(10)&"

' "&chr(10)&"      F=500·0.196=98.1 kN.F = 500 \cdot 0.196 = 9

'

   Selection.MoveDown Unit:=wdLine, Count:=27

End Sub

Sub Macro56()

'

' Macro56 Macro

' Example: A steel rod with L=2 mL = 2 \, \text{m} and cross-sectional area A=0.01 m2A = 0.01 \,
\text{m}^2 stretches by ?L=0.002 m\Delta L = 0.002 \, \text{m}. Find the stress if E=2·105 MPaE = 2 \cdot
10^5 \, \text{MPa}:

' "&chr(10)&"      1. Strain:

'

End Sub

Sub Macro57()

'

' Macro57 Macro

' 2. Stress:

' "&chr(10)&"

' "&chr(10)&"      s=E·?=2·105·0.001=200 MPa.\sigma = E \cdot \epsilon = 2 \cdot 10^5 \cdot 0.001 = 200
\, \text{MPa}.

'



'

End Sub

Sub Macro58()

'

' Macro58 Macro
```

```
' A gas at 1 atm1 \, \text{atm} and 300 K300 \, \text{K} has a volume 2 m32 \, \text{m}^3. Find its final volume if the pressure is halved:

' "&chr(10)&"      1. Using Boyle's Law (P1V1=P2V2P_1 V_1 = P_2 V_2):

' "&chr(10)&"

'

   Selection.MoveDown Unit:=wdLine, Count:=32

End Sub

Sub Macro59()

'

' Macro59 Macro

' A gas at 1 atm1 \, \text{atm} and 300 K300 \, \text{K} has a volume 2 m32 \, \text{m}^3. Find its final volume if the pressure is halved:

' "&chr(10)&"      1. Using Boyle's Law (P1V1=P2V2P_1 V_1 = P_2 V_2):

' "&chr(10)&"

'

   Selection.MoveDown Unit:=wdLine, Count:=24

End Sub

Sub Macro60()

Attribute Macro60.VB_Description = "1. Angular Velocity:
\r\n
\r\n          ?=at=4·3=12 rad/s.\\omega = \\alpha t = 4 \\cdot 3 = 12 \\, \\text{rad/s}.
\r\n          2. Work Done:
\r\n _

                    \r\n          W=12I?2=12·2·122=144 J.W = \\"

'

' Macro60 Macro

' 1. Angular Velocity:

' "&chr(10)&"

' "&chr(10)&"      ?=at=4·3=12 rad/s.\omega = \alpha t = 4 \cdot 3 = 12 \, \text{rad/s}.

' "&chr(10)&"      2. Work Done:

' "&chr(10)&"
```

```
' "&chr(10)&"      W=12I?2=12·2·122=144 J.W = \
'
End Sub
Sub Macro61()
'
' Macro61 Macro
'
' "&chr(10)&"      P=Q·?P?,P = \frac{Q \cdot \Delta P}{\eta},
' "&chr(10)&"      where Q=0.5/60 m3/sQ = 0.5/60 \, \text{m}^3/\text{s}, ?P=2×106 Pa\Delta P = 2 \times 10^6 \, \text{Pa}, and assume ?=0.85\eta = 0.85:
' "&chr(10)&"
'
End Sub
Sub Macro62()
'
' Macro62 Macro
'
' "&chr(10)&"      A=p·(0.025)2=1.96×10-3 m2.A = \pi \cdot (0.025)^2 = 1.96 \times 10^{-3} \, \text{m}^2.
' "&chr(10)&"      2. Stress:
' "&chr(10)&"
' "&chr(10)&"      s=FA=800001.96×10-3˜4.08×107 Pa.\sigma = \frac{F}{A} = \frac{80000}{1.96
'
End Sub
Sub Macro63()
'
' Macro63 Macro
'   Advanced Example: A gas undergoes an isothermal expansion from P1=3 atm,V1=2 m3P_1 = 3 \, \text{atm}, V_1 = 2 \, \text{m}^3 to V2=5 m3V_2 = 5 \, \text{m}^3. Calculate the work done:
' "&chr(10)&"
```

```
' "&chr(10)&"      W=P1V1ln?(V2V1),W = P_1
'
   Selection.MoveDown Unit:=wdLine, Count:=173
End Sub
Sub Macro64()
'
' Macro64 Macro
' Z=R2+(XL-XC)2,Z = \sqrt{R^2 + (X_L - X_C)^2},
' "&chr(10)&"      where XL=2pfLX_L = 2\pi fL and XC=12pfCX_C = \frac{1}{2\pi fC}.
' "&chr(10)&"      · Use phasor diagrams to analyze voltage and current relationships.
' "&chr(10)&"      · Pow
'
End Sub
Sub Macro65()
'
' Macro65 Macro
' o Resistance (RR) = 10 O10 \, \Omega,
' "&chr(10)&"      o Inductive Reactance (XLX_L) = 15 O15 \, \Omega,
' "&chr(10)&"      o Capacitive Reactance (XCX_C) = 5 O5 \, \Omega:
' "&chr(10)&"
' "&chr(10)&"      Z=R2+(XL-XC)2=102+(15
'
End Sub
Sub Macro66()
'
' Macro66 Macro
'
' "&chr(10)&"      Z=R2+(XL-XC)2=102+(15-5)2=100+100=14.14 O.Z = \sqrt{R^2 + (X_L - X_C)^2} =
\sqrt{10^2 + (15 - 5)^2} = \sqrt{100 + 100} = 14.14 \, \Omega.
```

```
' "&chr(10)&"      General Assessment Guidelines
' "&chr(10)&"      1. Practical Applications:
'
   Selection.MoveDown Unit:=wdLine, Count:=61
End Sub
Sub Macro67()
'
' Macro67 Macro
' Z=R2+(XL-XC)2,XL=2pfL,XC=12pfC.Z = \sqrt{R^2 + (X_L - X_C)^2}, \quad X_L = 2\pi fL, \quad X_C =
\frac{1}{2\pi fC}.
' "&chr(10)&"      3. Resonance:
' "&chr(10)&"      o Achieved when XL=XCX_L = X_C. Use:
' "&chr(10)&"
'
   Selection.MoveDown Unit:=wdLine, Count:=24
End Sub
Sub Macro68()
'
' Macro68 Macro
'
' "&chr(10)&"      Example Problem: A convection heater operates with 2 kW2 \, \text{kW}. Find the
energy used in 5 hours5 \, \text{hours}:
' "&chr(10)&"
' "&chr(10)&"      E=P·t=2·5=10 kWh.E = P \cdot t = 2 \cdot 5 = 10 \, \text{kWh}.
'
   Selection.MoveDown Unit:=wdLine, Count:=21
End Sub
Sub Macro69()
'
```

```
' Macro69 Macro

' Example Problem: An LED lamp uses 10 W10 \, \text{W} and operates for 4 hours/day4 \, \text{hours/day}. Calculate energy consumption in one month:

' "&chr(10)&"

' "&chr(10)&"      E=P·t·days=10·4·30=1.2 kWh.E = P \cdot t \cdot \text{days}

'

   Selection.MoveDown Unit:=wdLine, Count:=28

   Selection.MoveUp Unit:=wdLine, Count:=37

   Selection.Copy

End Sub

Sub Macro70()

'

' Macro70 Macro

' Module 4: Programmable Logic Controllers (PLCs)

' "&chr(10)&"      Key Topics:

' "&chr(10)&"      · Define PLCs, their components, and their programming languages (e.g., ladder logic).

' "&chr(10)&"      Practical Insights: PLC applications

'

   Selection.MoveDown Unit:=wdLine, Count:=23

   Selection.Copy

End Sub

Sub Macro71()

Attribute Macro71.VB_Description = "                                                                    \r\n          o
Calculate back emf:
\r\n
\r\n          Eb=V-IaRa.E_b = V - I_aR_a.
\r\n          2. Motor Torque:
\r\n          o Use: _

                                                    \r\n
\r\n          T=kIa?.T = k I_a \\ph"

'
```

```
' Macro71 Macro
'
' "&chr(10)&"      o Calculate back emf:
' "&chr(10)&"
' "&chr(10)&"      Eb=V-IaRa.E_b = V - I_aR_a.
' "&chr(10)&"      2. Motor Torque:
' "&chr(10)&"      o Use:
' "&chr(10)&"
' "&chr(10)&"      T=kIa?.T = k I_a \ph
'
   Selection.MoveDown Unit:=wdLine, Count:=17
   Selection.Copy
End Sub
Sub Macro72()
'
' Macro72 Macro
' Example Problem: Find the torque of a DC motor with Ia=10 AI_a = 10 \, \text{A}, ?=0.02 Wb\phi = 0.02 \, \text{Wb}, and k=1k = 1:
' "&chr(10)&"
' "&chr(10)&"      T=kIa?=1·10·0.02=0.2 Nm.T = k I_a \phi = 1 \cdot 10 \cdot 0.02 = 0.2 \, \tex
'
   Selection.MoveRight Unit:=wdCharacter, Count:=1
   Selection.MoveDown Unit:=wdLine, Count:=26
   Selection.Copy
End Sub
Sub Macro73()
'
' Macro73 Macro
'
```

```
' "&chr(10)&"      S=ns-nrns,ns=120fP.S = \frac{n_s - n_r}{n_s}, \quad n_s = \frac{120f}{P}.

' "&chr(10)&"      Example Problem: For a motor with f=50 Hzf = 50 \, \text{Hz} and P=4P = 4, calculate synchronous speed:

' "&chr(10)&"

'

   Selection.MoveDown Unit:=wdLine, Count:=31

   Selection.Copy

End Sub

Sub Macro74()

'

' Macro74 Macro

'

' "&chr(10)&"      Example Problem: A transformer has Pcore=200 WP_{core} = 200 \, \text{W} and Pcopper=300 WP_{copper} = 300 \, \text{W}. Calculate efficiency when delivering Pout=1000 WP_{out} = 1000 \, \text{W}:

' "&chr(10)&"

' "&chr(10)&"      ?

'

   Selection.MoveDown Unit:=wdLine, Count:=20

   Selection.Copy

End Sub

Sub Macro75()

'

' Macro75 Macro

'

' "&chr(10)&"      · System earthing for safety and fault detection.

' "&chr(10)&"      · Earthing networks and neutral conductor importance.

' "&chr(10)&"      Practical Insights: Proper earthing prevents hazards such as electric shocks and ensures f

'
```

```
    Selection.MoveDown Unit:=wdLine, Count:=39
    Selection.MoveUp Unit:=wdLine, Count:=1
    Selection.MoveDown Unit:=wdLine, Count:=25
    Selection.Copy
End Sub
Sub Macro76()
'
' Macro76 Macro
'
' "&chr(10)&"      Enhanced Example: A geyser thermostat heats 50 kg50 \, \text{kg} of water from 25°C25^\circ \text{C} to 80°C80^\circ \text{C}. Find the energy required if the specific heat capacity of water is 4200 J/kg°C4200 \, \text{J/kg}^\circ\text{C}:
'
    Selection.MoveDown Unit:=wdLine, Count:=22
    Selection.Copy
End Sub
Sub Macro77()
'
' Macro77 Macro
'
' "&chr(10)&"      E=50·4200·55=11,550,000 J or 11.55 MJ.E = 50 \cdot 4200 \cdot 55 = 11,550,000 \, \text{J} \, \text{or} \, 11.55 \, \text{MJ}.
' "&chr(10)&"      Module 3: Lighting Systems
' "&chr(10)&"      Expanded Example: A compact f
'
    Selection.Copy
    Selection.Copy
End Sub
Sub Macro78()
'
```

```
' Macro78 Macro

' Expanded Example: A compact fluorescent lamp operates at 15 W15 \, \text{W} for 10 hours/day10 \, \text{hours/day}. Calculate energy consumption for 30 days30 \, \text{days}.

' "&chr(10)&"      Solution:

' "&chr(10)&"      1. Daily Energy:

'

End Sub

Sub Macro79()

'

' Macro79 Macro

' Edaily=P·t=15·10=150 Wh.E_{\text{daily}} = P \cdot t = 15 \cdot 10 = 150 \, \text{Wh}.

' "&chr(10)&"      2. Monthly Energy:

' "&chr(10)&"

' "&chr(10)&"      Emonthly=150·30=4500 Wh=4.5 kWh.E_{\text{monthly}} = 150 \cdot 30 = 4500 \,

'

   Selection.Copy

End Sub

Sub Macro80()

'

' Macro80 Macro

' Advanced Torque Calculation: A DC motor draws Ia=15 AI_a = 15 \, \text{A} with a magnetic flux of ?=0.03 Wb\phi = 0.03 \, \text{Wb}. Find the armature torque if k=1.2k = 1.2.

' "&chr(10)&"      Solution:

' "&chr(10)&"      1. Torque:

'

   Selection.Copy

End Sub

Sub Macro81()

'
```

```
' Macro81 Macro
' T=kIa?=1.2·15·0.03=0.54 Nm.T = k I_a \phi = 1.2 \cdot 15 \cdot 0.03 = 0.54 \, \text{Nm}.
' "&chr(10)&"      Module 6: Alternating Current Machines
' "&chr(10)&"      Speed Analysis Example: For a three-phase induction motor with f=60 Hzf = 60 \,
'
   Selection.Copy
End Sub
Sub Macro82()
'
' Macro82 Macro
'
' "&chr(10)&"      ns=120fP=120·604=1800 RPM.n_s = \frac{120f}{P} = \frac{120 \cdot 60}{4} = 1800 \,
\text{RPM}.
' "&chr(10)&"      2. Rotor Speed:
' "&chr(10)&"
' "&chr(10)&"      nr=ns(1-S)=1800(1-0.05)=1710 RPM.n_r = n_s (1 - S) = 1800 (
'
   Selection.MoveDown Unit:=wdLine, Count:=198
   Selection.Copy
End Sub
Sub Macro83()
'
' Macro83 Macro
' Promotional Mark: 40% ICASS + 60% Exam marks (minimum 40% required for exam qualification).
' "&chr(10)&"      Exam Setup:
' "&chr(10)&"      · Duration: 3 hours.
' "&chr(10)&"      · Closed book, formula sheet included.
'
   Selection.Copy
```

```
End Sub
Sub Macro84()
'
' Macro84 Macro
'
' "&chr(10)&"      o Application: 30–40%.
' "&chr(10)&"      o Analysis/Evaluation: 20–25%.
' "&chr(10)&"      Mark Allocation by Module
' "&chr(10)&"      Module  Weighting (%)
' "&chr(10)&"      Principles of Electricity   30
'


'
   Selection.MoveDown Unit:=wdLine, Count:=43
   Selection.Copy
End Sub
Sub Macro85()
Attribute Macro85.VB_Description = "                                                    \r\n          B=µI2pr,B =
\\frac{\\mu I}{2 \\pi r},
\r\n          where µ\\mu is permeability.
\r\n          3. Inductance in DC Circuits:
\r\n          o Find inductance:
\r\n _
                                                                    \r\n          L=N2µAl,L "
'
' Macro85 Macro
'
' "&chr(10)&"      B=µI2pr,B = \frac{\mu I}{2 \pi r},
' "&chr(10)&"      where µ\mu is permeability.
' "&chr(10)&"      3. Inductance in DC Circuits:
```

```
' "&chr(10)&"      o Find inductance:
' "&chr(10)&"
' "&chr(10)&"      L=N2μAl,L
'
   Selection.MoveDown Unit:=wdLine, Count:=65
   ActiveWindow.ActivePane.VerticalPercentScrolled = -103
   Selection.Copy
End Sub
Sub Macro86()
'
' Macro86 Macro
'
' "&chr(10)&"      To calculate the energy dissipated in resistive circuits over time, use:
' "&chr(10)&"
' "&chr(10)&"      E=?0TP(t) dt,P(t)=I(t)2R.E = \int_0^T P(t) \, dt, \quad P(t) = I(t)^2 R.
' "&chr(10)&"      Example: A resistor
'
   Selection.Copy
End Sub
Sub Macro87()
'
' Macro87 Macro
'
' "&chr(10)&"      1. Substitute I(t)I(t):
' "&chr(10)&"
' "&chr(10)&"      E=?02(4sin?(pt))2·5 dt=5?0216sin?2(pt) dt.E = \int_0^2 (4 \sin(\pi t))^2 \cdot 5 \, dt = 5
\int_0^2 16 \sin^2(\pi t) \, dt.
' "&chr(10)&"      2. Simplify using sin?2(x)=
'
```

```
   Selection.Copy
End Sub
Sub Macro88()
Attribute Macro88.VB_Description = "                                                    \r\n          3. Solve:
\r\n
\r\n          ?021 dt=2,?02cos?(2pt) dt=0.\\int_0^2 1 \\, dt = 2, \\quad \\int_0^2 \\cos(2\\pi t) \\, dt = 0.
\r\n          Thus:
\r\n _
                                                                    \r\n          E=40·2=80 J.E "
'
' Macro88 Macro
'
' "&chr(10)&"      3. Solve:
' "&chr(10)&"
' "&chr(10)&"      ?021 dt=2,?02cos?(2pt) dt=0.\int_0^2 1 \, dt = 2, \quad \int_0^2 \cos(2\pi t) \, dt = 0.
' "&chr(10)&"      Thus:
' "&chr(10)&"
' "&chr(10)&"      E=40·2=80 J.E
'
   Selection.Copy
End Sub
Sub Macro89()
'
' Macro89 Macro
' dVdt=IC,where I=VR.\frac{dV}{dt} = \frac{I}{C}, \quad \text{where } I = \frac{V}{R}.
' "&chr(10)&"      Example: For V(t)=50exp?(-t/RC) VV(t) = 50 \exp(-t/RC) \, \text{V}, calculate the rate of
voltage drop at t=2 st = 2 \, \text{s} given R=10 OR = 1
'
   Selection.Copy
End Sub
```

```
Sub Macro90()
'
' Macro90 Macro
' 1. Differentiate V(t)V(t):
' "&chr(10)&"
' "&chr(10)&"      dVdt=ddt(50exp?(-t/(10·0.01)))=50·-10.1exp?(-t/0.1).\frac{dV}{dt} = \frac{d}{dt} \left( 50 \exp(-t/(10 \cdot 0.01)) \right) = 50 \cdot -\frac{1}{0.1} \exp(-t/0.1).
'
   Selection.Copy
End Sub
Sub Macro91()
'
' Macro91 Macro
' Magnetic flux through a coil with NN turns is:
' "&chr(10)&"
' "&chr(10)&"      F=?B dA,\Phi = \int B \, dA,
' "&chr(10)&"      where BB is the magnetic field strength.
' "&chr(10)&"      Example: A uniform magnetic field B=0.02
'
   Selection.MoveDown Unit:=wdLine, Count:=22
   Selection.Copy
End Sub
Sub Macro92()
'
' Macro92 Macro
'
' "&chr(10)&"      A=0.1·0.1=0.01 m2.A = 0.1 \cdot 0.1 = 0.01 \, \text{m}^2.
' "&chr(10)&"      2. Flux:
' "&chr(10)&"
```

```
' "&chr(10)&"      F=B·A=0.02·0.01=2×10-4 Wb.\Phi = B \cdot A = 0.02 \cdot 0.01 = 2 \times 10^{-4} \, \text{Wb}.
'
    Selection.MoveDown Unit:=wdLine, Count:=27
    Selection.Copy
End Sub
Sub Macro93()
'
' Macro93 Macro
'
' "&chr(10)&"      Z=R2+(XL-XC)2,XL=2pfL,XC=12pfC.Z = \sqrt{R^2 + \left( X_L - X_C \right)^2}, \quad X_L = 2\pi f L, \quad X_C = \frac{1}{2\pi f C}.
' "&chr(10)&"      Example: Find dZdf\frac{dZ}{df} for R=50 OR = 50 \, \Omega, L=0.1 HL = 0.1 \
'
    Selection.MoveDown Unit:=wdLine, Count:=23
    ActiveWindow.ActivePane.VerticalPercentScrolled = -124
    Selection.Copy
End Sub
Sub Macro94()
'
' Macro94 Macro
'
' "&chr(10)&"      Vout(t)=RC·dVindt=(1×103·10×10-6)·10·2pcos?(2pt).V_{out}(t) = RC \cdot \frac{dV_{in}}{dt} = (1 \times 10^3 \cdot 10 \times 10^{-6}) \cdot 10 \cdot 2\pi \cos(2\pi t).
' "&chr(10)&"
' "&chr(10)&"      Vout(t)=0.2pcos?(2pt) V.V_{o
'
    Selection.MoveDown Unit:=wdLine, Count:=19
    Selection.Copy
End Sub
```

```
Sub Macro95()
'
' Macro95 Macro
' Vout(t)=1RC?Vin(t) dt.V_{out}(t) = \frac{1}{RC} \int V_{in}(t) \, dt.
' "&chr(10)&"      Example: For Vin(t)=5t VV_{in}(t) = 5t \, \text{V}, find Vout(t)V_{out}(t) with R=2 kOR = 2 \, \text{k}\Omega, C=100 µFC = 100 \, \mu\text{F}.
'
   Selection.Copy
End Sub
Sub Macro96()
Attribute Macro96.VB_Description = "\r\n              1. Integrate VinV_{in}:
\r\n
\r\n          ?Vin(t) dt=?5t dt=5t22.\\int V_{in}(t) \\, dt = \\int 5t \\, dt = \\frac{5t^2}{2}.
\r\n          2. Calculate Vout(t)V_{out}(t):
\r\n _
                                                  "
'
' Macro96 Macro
'
' "&chr(10)&"      1. Integrate VinV_{in}:
' "&chr(10)&"
' "&chr(10)&"      ?Vin(t) dt=?5t dt=5t22.\int V_{in}(t) \, dt = \int 5t \, dt = \frac{5t^2}{2}.
' "&chr(10)&"      2. Calculate Vout(t)V_{out}(t):
' "&chr(10)&"
'
   Selection.MoveDown Unit:=wdLine, Count:=23
   Selection.Copy
End Sub
Sub Macro97()
'
```

```
' Macro97 Macro

' Rs=Vsupply-VzenerIzener.R_s = \frac{V_{supply} - V_{zener}}{I_{zener}}.

' "&chr(10)&"      Power Dissipation in the Zener:

' "&chr(10)&"

' "&chr(10)&"      P=Vzener·Izener.P = V_{zener} \cdot I_{zener}.

' "&chr(10)&"      Example

'

   Selection.Copy

End Sub

Sub Macro98()

Attribute Macro98.VB_Description = "                                                                    \r\n          1.
Series Resistance:
\r\n
\r\n          Rs=15-5.60.05=188 O.R_s = \\frac{15 - 5.6}{0.05} = 188 \\, \\Omega.
\r\n          2. Power Dissipation:
\r\n _
                                                                                    \r\n          P=5.6·0."

'

' Macro98 Macro

'

' "&chr(10)&"      1. Series Resistance:

' "&chr(10)&"

' "&chr(10)&"      Rs=15-5.60.05=188 O.R_s = \frac{15 - 5.6}{0.05} = 188 \, \Omega.

' "&chr(10)&"      2. Power Dissipation:

' "&chr(10)&"

' "&chr(10)&"      P=5.6·0.

'

   Selection.MoveDown Unit:=wdLine, Count:=28

   Selection.Copy

End Sub
```

```
Sub Macro99()
'
' Macro99 Macro
'   f0=12pLC.f_0 = \frac{1}{2\pi\sqrt{LC}}.
' "&chr(10)&"      Example: For L=5 mHL = 5 \, \text{mH} and C=200 µFC = 200 \, \mu\text{F}, calculate f0f_0:
' "&chr(10)&"
' "&chr(10)&"      f0=12p5×10-3·200×10-6.f_0 = \frac{1}{2\pi\sqrt{5 \
'
   Selection.MoveDown Unit:=wdLine, Count:=83
   Selection.Copy
End Sub
Sub Macro100()
'
' Macro100 Macro
'
' "&chr(10)&"      Calculate the rate of change of input voltage dVdt\frac{dV}{dt}, capacitance (CC), resistance (RR), and time constant for an RC integrator given:
' "&chr(10)&"      · R=2 kOR = 2 \, \text{k}\Omega,
' "&chr(10)&"      · C=50 µFC = 5
'
   Selection.Copy
End Sub
Sub Macro101()
Attribute Macro101.VB_Description = "1. Time Constant:
\r\n
\r\n          t=RC=2×103·50×10-6=0.1 s.\\tau = RC = 2 \\times 10^3 \\cdot 50 \\times 10^{-6} = 0.1 \\, \\text{s}.
\r\n          2. Rate of Change:
\r\n _
                                    \r\n          dV"
```

```
'
' Macro101 Macro
' 1. Time Constant:
' "&chr(10)&"
' "&chr(10)&"      t=RC=2×103·50×10-6=0.1 s.\tau = RC = 2 \times 10^3 \cdot 50 \times 10^{-6} = 0.1 \, \text{s}.
' "&chr(10)&"      2. Rate of Change:
' "&chr(10)&"
' "&chr(10)&"      dV
'
    Selection.Copy
End Sub
Sub Macro102()
'
' Macro102 Macro
'
' "&chr(10)&"      Calculation Example: If R=100 OR = 100 \, \Omega, L=0.1 HL = 0.1 \, \text{H}, and Vin(t)=20sin?(10t)V_{in}(t) = 20 \sin(10t), calculate:
' "&chr(10)&"      1. Time Constant:
' "&chr(10)&"
' "&chr(10)&"      t=LR=0.1100=0.0
'
    Selection.MoveDown Unit:=wdLine, Count:=29
    Selection.Copy
End Sub
Sub Macro103()
'
' Macro103 Macro
' Analysis Using Complex Numbers:
```

```
' "&chr(10)&"      In an RLC circuit:

' "&chr(10)&"      1. Impedance:

' "&chr(10)&"

' "&chr(10)&"      Z=R+j(XL-XC),XL=?L,XC=1?C.Z = R + j(X_L - X_C), \quad X_L = \omega L, \quad X_C =
\frac{1}{\o
'

   Selection.Copy

End Sub

Sub Macro104()

'

' Macro104 Macro

'   Z=R+j(XL-XC),XL=?L,XC=1?C.Z = R + j(X_L - X_C), \quad X_L = \omega L, \quad X_C = \frac{1}{\omega C}.

' "&chr(10)&"      2. Power Factor:

' "&chr(10)&"

' "&chr(10)&"      cos??=R|Z|.\cos\phi = \frac{R}{|Z|}.

' "&chr(10)&"      E

'

   Selection.Copy

End Sub

Sub Macro105()

'

' Macro105 Macro

'

' "&chr(10)&"      Example:

' "&chr(10)&"      For R=10 OR = 10 \, \Omega, L=0.05 HL = 0.05 \, \text{H}, C=20 µFC = 20 \, \mu\text{F},
and f=1 kHzf = 1 \, \text{kHz}:

' "&chr(10)&"      1. Calculate XLX_L and XCX_C:

' "&chr(10)&"

'
```

```
    Selection.Copy
End Sub
Sub Macro106()
'
' Macro106 Macro
'
' "&chr(10)&"      Z=R2+(XL-XC)2=102+(314-8)2~306 O.Z = \sqrt{R^2 + (X_L - X_C)^2} = \sqrt{10^2 + (314 - 8)^2} \approx 306 \, \Omega.
' "&chr(10)&"      Resonance in RLC Circuits
' "&chr(10)&"      Key Formulas:
' "&chr(10)&"      1. Resonance Fr
'
    ActiveWindow.ActivePane.VerticalPercentScrolled = -147
    Selection.MoveDown Unit:=wdLine, Count:=1
    Selection.Copy
End Sub
Sub Macro107()
'
' Macro107 Macro
' Industrial Electronics N4 syllabus focuses on building a strong foundation in electrical and electronic principles through key modules like Network Theorems, Alternating Current Theory, Electronic Power Control, and others. Here's a breakdown of the core
'
    Selection.MoveDown Unit:=wdLine, Count:=31
    Selection.Copy
End Sub
Sub Macro108()
'
' Macro108 Macro
'
```

```
' "&chr(10)&"      ?Iin=?Iout.\sum I_{\text{in}} = \sum I_{\text{out}}.
' "&chr(10)&"      2. Second Law (Voltage Law):
' "&chr(10)&"      o The sum of voltage drops in a closed loop equals the sum of EMFs:
' "&chr(10)&"
'
   Selection.Copy
End Sub
Sub Macro109()
'
' Macro109 Macro
'
' "&chr(10)&"      ?V=0.\sum V = 0.
' "&chr(10)&"      Example: For a loop with V1=10 VV_1 = 10 \, \text{V}, R1=2 OR_1 = 2 \, \Omega, and R2=3 OR_2 = 3 \, \Omega:
' "&chr(10)&"      1. Apply Kirchhoff's Voltage Law:
' "&chr(10)&"
'
   Selection.MoveDown Unit:=wdLine, Count:=20
   Selection.Copy
End Sub
Sub Macro110()
'
' Macro110 Macro
' o Any linear circuit can be simplified to a single voltage source (VthV_{th}) and a series resistance (RthR_{th}).
' "&chr(10)&"      2. Steps:
' "&chr(10)&"      o Remove the load.
' "&chr(10)&"      o Calculate VthV_{th} across the open t
'
```

```
    Selection.Copy
End Sub
Sub Macro111()
'
' Macro111 Macro
' o Determine RthR_{th} by deactivating all sources (replace voltage sources with short circuits and current sources with open circuits).
' "&chr(10)&"      Example: For a circuit with Vs=12 VV_s = 12 \, \text{V}, R1=4 OR_1 = 4 \, \Omega, and R2=6 OR_2
'
    Selection.MoveDown Unit:=wdLine, Count:=33
    Selection.Copy
End Sub
Sub Macro112()
'
' Macro112 Macro
' Example: For Rth=10 OR_{th} = 10 \, \Omega, calculate maximum power if Vth=20 VV_{th} = 20 \, \text{V}:
' "&chr(10)&"
' "&chr(10)&"      Pmax=Vth24Rth=2024·10=10 W.P_{\text{max}} = \frac{V_{th}^2}{4R_{th}} = \frac{20^2}{4 \cdot 10} = 10 \,
'
    Selection.Copy
End Sub
Sub Macro113()
'
' Macro113 Macro
'
' "&chr(10)&"      Z=R+j(XL-XC),XL=?L,XC=1?C.Z = R + j(X_L - X_C), \quad X_L = \omega L, \quad X_C = \frac{1}{\omega C}.
```

```
' "&chr(10)&"      · Parallel Circuit:

' "&chr(10)&"

' "&chr(10)&"      1Z=1R2+(1XC-1XL)2.\frac{1}{Z} = \sqrt{\frac{1}{R

'

   Selection.Copy

End Sub

Sub Macro114()

'

' Macro114 Macro

' Example: For R=10 OR = 10 \, \Omega, L=0.1 HL = 0.1 \, \text{H}, C=10 µFC = 10 \, \mu\text{F}, and f=50 Hzf = 50 \, \text{Hz}:

' "&chr(10)&"      1. Inductive Reactance:

' "&chr(10)&"

' "&chr(10)&"      XL=2pfL=2p·50·0.1=31.4 O.X_L =

'

   Selection.MoveDown Unit:=wdLine, Count:=38

   Selection.Copy

End Sub

Sub Macro115()

'

' Macro115 Macro

' 2. Bandwidth:

' "&chr(10)&"

' "&chr(10)&"      BW=frQ,Q=?rLR.BW = \frac{f_r}{Q}, \quad Q = \frac{\omega_r L}{R}.

' "&chr(10)&"      Example: For L=0.5 HL = 0.5 \, \text{H}, C=20 µFC = 20 \, \mu\text{F}, and R=10 OR = 10 \, \Omega:

'

   Selection.Copy

End Sub
```

```
Sub Macro116()
'
' Macro116 Macro
'
' "&chr(10)&"
' "&chr(10)&"      fr=12p0.5·20×10-6˜50.33 Hz.f_r = \frac{1}{2\pi\sqrt{0.5 \cdot 20 \times 10^{-6}}}
\approx 50.33 \, \text{Hz}.
' "&chr(10)&"      2. Quality Factor:
' "&chr(10)&"
' "&chr(10)&"      Q=?rLR=2p·50
'
   Selection.MoveDown Unit:=wdLine, Count:=59
   Selection.Copy
End Sub
Sub Macro117()
Attribute Macro117.VB_Description = "\r\n            3.1 Semiconductor Diode
\r\n          1. Diode Equation:
\r\n          o Forward current:
\r\n
\r\n          I=Is·(eqVkT-1),I = I_s \\cdot \\left(e^{\\frac{qV}{kT}} - 1\\right), _
                                        \r\n          whe"
'
' Macro117 Macro
'
' "&chr(10)&"      3.1 Semiconductor Diode
' "&chr(10)&"      1. Diode Equation:
' "&chr(10)&"      o Forward current:
' "&chr(10)&"
' "&chr(10)&"      I=Is·(eqVkT-1),I = I_s \cdot \left(e^{\frac{qV}{kT}} - 1\right),
' "&chr(10)&"      whe
```

```
'
    Selection.Copy
End Sub
Sub Macro118()
'
' Macro118 Macro
'
' "&chr(10)&"      Example Calculation: Given Is=10-12 AI_s = 10^{-12} \, \text{A}, V=0.7 VV = 0.7 \, \text{V}, T=300 KT = 300 \, \text{K}:
' "&chr(10)&"      1. Compute:
' "&chr(10)&"
' "&chr(10)&"      I=10-12·(e1.6×10-19·0.71.38×10-23·30
'
    Selection.Copy
End Sub
Sub Macro119()
'
' Macro119 Macro
'
' "&chr(10)&"      I=10-12·(e1.6×10-19·0.71.38×10-23·300-1).I = 10^{-12} \cdot \left(e^{\frac{1.6 \times 10^{-19} \cdot 0.7}{1.38 \times 10^{-23} \cdot 300}} - 1\right).
' "&chr(10)&"      2. Result:
' "&chr(10)&"
' "&chr(10)&"      I˜0.001
'
    Selection.MoveDown Unit:=wdLine, Count:=20
    Selection.Copy
End Sub
Sub Macro120()
```

```
'

' Macro120 Macro

' 3.2 Electronic Power Control Devices

' "&chr(10)&"      · SCR (Silicon Controlled Rectifier):

' "&chr(10)&"      o Conducts when triggered by a gate signal, and blocks when reversed.

' "&chr(10)&"      · DIAC:

' "&chr(10)&"      o Bidi

'

   Selection.MoveDown Unit:=wdLine, Count:=35

End Sub

Sub Macro121()

Attribute Macro121.VB_Description = "Transformer Ratios:
\r\n          · Voltage Ratio:
\r\n
\r\n          Vs=Vp·NsNp.V_s = V_p \\cdot \\frac{N_s}{N_p}.
\r\n          · Current Ratio: _

            \r\n
\r\n          Is=Ip·NpNs."

'

' Macro121 Macro

' Transformer Ratios:

' "&chr(10)&"      · Voltage Ratio:

' "&chr(10)&"

' "&chr(10)&"      Vs=Vp·NsNp.V_s = V_p \cdot \frac{N_s}{N_p}.

' "&chr(10)&"      · Current Ratio:

' "&chr(10)&"

' "&chr(10)&"      Is=Ip·NpNs.

'

   Selection.Copy

End Sub
```

```
Sub Macro122()
'
' Macro122 Macro
'
' "&chr(10)&"      Is=Ip·NpNs.I_s = I_p \cdot \frac{N_p}{N_s}.
' "&chr(10)&"      Example Calculation: Given Np=300N_p = 300, Ns=100N_s = 100, and Vp=240 V
RMSV_p = 240 \, \text{V RMS}:
' "&chr(10)&"      1. Secondary Voltage:
' "&chr(10)&"
'
   Selection.Copy
End Sub
Sub Macro123()
'
' Macro123 Macro
'      RF=(VACVDC)2-1.RF = \sqrt{\left(\frac{V_{AC}}{V_{DC}}\right)^2 - 1}.
' "&chr(10)&"      2. Full-Wave Rectifier:
' "&chr(10)&"      o Utilizes both cycles, reducing ripple.
' "&chr(10)&"      Efficiency:
' "&chr(10)&"
'
   Selection.Copy
End Sub
Sub Macro124()
Attribute Macro124.VB_Description = "                                                    \r\n
\r\n          ?=PDCPAC.\\eta = \\frac{P_{DC}}{P_{AC}}.
\r\n          Module 5: Amplifiers
\r\n          Transistor Amplifier Configurations
\r\n          1. Common Emitter (CE): _
                                                                                  \r\n          "
```

```
'
' Macro124 Macro
'
' "&chr(10)&"
' "&chr(10)&"      ?=PDCPAC.\eta = \frac{P_{DC}}{P_{AC}}.
' "&chr(10)&"      Module 5: Amplifiers
' "&chr(10)&"      Transistor Amplifier Configurations
' "&chr(10)&"      1. Common Emitter (CE):
' "&chr(10)&"
'
   Selection.Copy
End Sub
Sub Macro125()
'
' Macro125 Macro
'
' "&chr(10)&"      1. AM Signal Equation:
' "&chr(10)&"
' "&chr(10)&"      m(t)=Ac(1+macos??mt)cos??ct,m(t) = A_c(1 + m_a \cos \omega_m t) \cos \omega_c t,
' "&chr(10)&"      where mam_a: modulation index, AcA_c: carrier amplitude, ?c\ome
'
   Selection.Copy
End Sub
Sub Macro126()
'
' Macro126 Macro
'
' "&chr(10)&"      2. FM Signal Equation:
' "&chr(10)&"
```

```
' "&chr(10)&"      f(t)=cos?(?ct+ßsin??mt),f(t) = \cos (\omega_c t + \beta \sin \omega_m t),
' "&chr(10)&"      where ß\beta: modulation index.
'
   Selection.Copy
End Sub
Sub Macro127()
'
' Macro127 Macro
' · Demodulation:
' "&chr(10)&"      o Reverse process to recover original information from modulated signals.
' "&chr(10)&"      o Methods include envelope detection (AM) and phase-lock loops (FM).
' "&chr(10)&"      2. Antenna Systems
'
   Selection.MoveDown Unit:=wdLine, Count:=89
   Selection.Copy
End Sub
Sub Macro128()
'
' Macro128 Macro
' Advanced Calculations in Signal Modulation
' "&chr(10)&"      1. Amplitude Modulation (AM):
' "&chr(10)&"      The transmitted AM signal is given by:
' "&chr(10)&"
' "&chr(10)&"      m(t)=Ac[1+macos?(?mt)]cos?(?ct),m(t) = A_c [1
'
   Selection.MoveDown Unit:=wdLine, Count:=27
   Selection.Copy
End Sub
Sub Macro129()
```

```
'
' Macro129 Macro
'
' "&chr(10)&"      · mam_a: Modulation index, calculated as ma=AmAcm_a = \frac{A_m}{A_c},
' "&chr(10)&"      · ?c=2pfc\omega_c = 2\pi f_c: Carrier angular frequency,
' "&chr(10)&"      · ?m=2pfm\omega_m = 2\pi f_m: Message angular frequency.
'
   Selection.Copy
End Sub
Sub Macro130()
'
' Macro130 Macro
'
' "&chr(10)&"      Example Calculation: For Ac=5 VA_c = 5 \, \text{V}, Am=2 VA_m = 2 \, \text{V}, fc=100 kHzf_c = 100 \, \text{kHz}, fm=1 kHzf_m = 1 \, \text{kHz}:
' "&chr(10)&"      1. Modulation Index:
' "&chr(10)&"
' "&chr(10)&"      ma=AmAc=25
'
   Selection.Copy
End Sub
Sub Macro131()
'
' Macro131 Macro
' 2. AM Signal Equation:
' "&chr(10)&"
' "&chr(10)&"      m(t)=5[1+0.4cos?(2p·1000t)]cos?(2p·100000t).m(t) = 5 [1 + 0.4 \cos(2\pi \cdot 1000 t)] \cos(2\pi \cdot 100000 t).
' "&chr(10)&"      2. Frequency Modulation (FM):
```

```
'
    Selection.Copy
End Sub
Sub Macro132()
'
' Macro132 Macro
'
' "&chr(10)&"      Example Calculation: For ?f=5 kHz\Delta f = 5 \, \text{kHz}, fm=1 kHzf_m = 1 \,
\text{kHz}, and Ac=10 VA_c = 10 \, \text{V}:
' "&chr(10)&"      1. Modulation Index:
' "&chr(10)&"
' "&chr(10)&"      ß=?ffm=50001000=5.\b
'
    ActiveWindow.ActivePane.VerticalPercentScrolled = -173
    Selection.Copy
End Sub
Sub Macro133()
'
' Macro133 Macro
' o Testing electrical wiring.
' "&chr(10)&"      o Fault-finding in electrical machines.
' "&chr(10)&"      o Renewable energy system maintenance.
' "&chr(10)&"      5. Practical Career Applications
' "&chr(10)&"      · Learners apply s
'
    ActiveWindow.ActivePane.VerticalPercentScrolled = -173
    Selection.Copy
End Sub
Sub Macro134()
```

```
'

' Macro134 Macro

'

' "&chr(10)&"      Key Role: Integrals help analyze energy storage, system behavior over time, and power distribution in circuits.

' "&chr(10)&"      · Energy Stored in Capacitors: $$ E = \frac{1}{2} C V^2 $$ Example: For a capacitor with C=10µFC = 10 \m

'

   Selection.Copy

End Sub

Sub Macro135()

'

' Macro135 Macro

'

' "&chr(10)&"      · Total Energy in a Time Period (AC Systems): Calculate energy consumption using: $$ E = \int P(t) \, dt $$. If P(t)=5sin?(2pt)P(t) = 5 \sin(2\pi t), solve: $$ E = \int_0^{1} 5 \sin(2\pi t) \, dt. $$

' "&chr(10)&"      2. Derivative Calc

'

   Selection.Copy

End Sub

Sub Macro136()

'

' Macro136 Macro

'

' "&chr(10)&"      · Induced Voltage in Inductors: Voltage across an inductor is: $$ V(t) = L \frac{di(t)}{dt}. $$ Example: With L=5HL = 5H and i(t)=t2i(t) = t^2: $$ V(t) = 5 \times \frac{d(t^2)}{dt} = 10t. $$ At \( t = 2s, V(2) = 10 \times 2 = 20V. $$

'

   Selection.MoveDown Unit:=wdLine, Count:=102

   Selection.Copy
```

```
End Sub

Sub Macro137()

'

' Macro137 Macro

'

' "&chr(10)&"      · Resistance Testing:

' "&chr(10)&"      o Verifying earth resistance must ensure values below 2 O, calculated using Ohm’s law:
$$ R = \frac{V}{I} $$

' "&chr(10)&"      · Insulation Resistance:

' "&chr(10)&"      o This should exceed

'

End Sub

Sub Macro138()

'

' Macro138 Macro

'

' "&chr(10)&"      o Verifying earth resistance must ensure values below 2 O, calculated using Ohm’s law:
$$ R = \frac{V}{I} $$

' "&chr(10)&"      · Insulation Resistance:

' "&chr(10)&"      o This should exceed 1 MO, confirming isolation standards

'

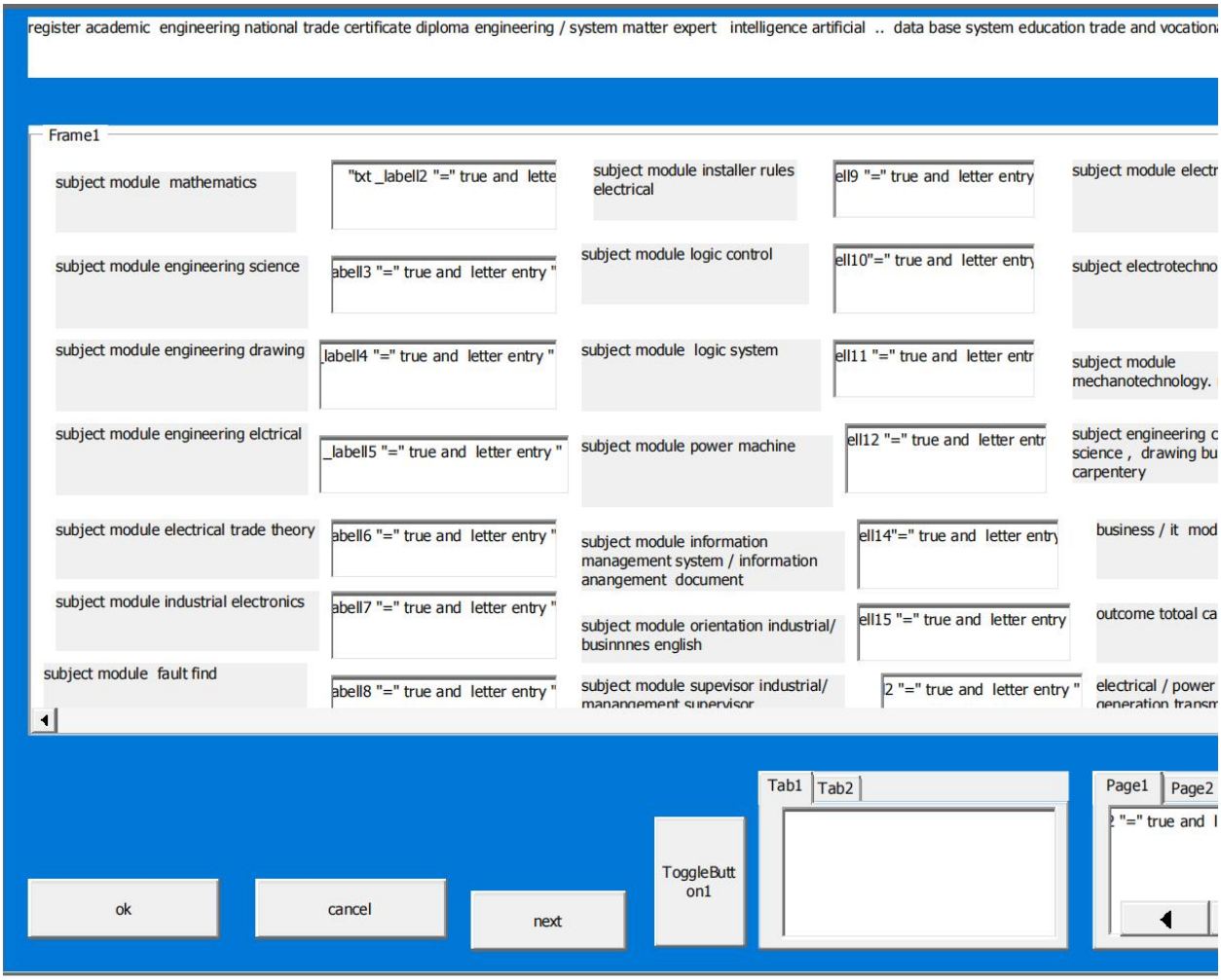
   Selection.MoveDown Unit:=wdLine, Count:=57

End Sub
```

```
Private Sub Label1_Click()
End Sub
Private Sub Label15_Click()
End Sub
Private Sub Label2_Click()
End Sub
Private Sub Label9_Click()
End Sub
Private Sub ListBox1_Click()
End Sub
Private Sub MultiPage1_Change()
End Sub
Private Sub MultiPage2_Change()
End Sub
Private Sub SpinButton1_Change()
End Sub
Private Sub SpinButton2_Change()
End Sub
Private Sub TabStrip1_Change()
End Sub
Private Sub TextBox1_Change()
End Sub
Private Sub TextBox10_Change()
End Sub
Private Sub TextBox11_Change()
End Sub
Private Sub TextBox13_Change()
End Sub
Private Sub TextBox14_Change()
End Sub
Private Sub TextBox15_Change()
End Sub
Private Sub TextBox16_Change()
End Sub
Private Sub TextBox17_Change()
End Sub
Private Sub TextBox18_Change()UserForm1 - 2
End Sub
Private Sub TextBox19_Change()
End Sub
Private Sub TextBox2_Change()
End Sub
Private Sub TextBox20_Change()
End Sub
Private Sub TextBox21_Change()
End Sub
Private Sub TextBox4_Change()
End Sub
Private Sub TextBox6_Change()
End Sub
Private Sub TextBox7_Change()
End Sub
Private Sub TextBox8_Change()
End Sub
Private Sub TextBox9_Change()
End Sub
```

```
Private Sub ToggleButton1_Click()
End Sub
Private Sub UserForm_AddControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean, ByVal Control As
MSForms.Co
ntrol, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal State As MSForms.
fmDragState, ByVal Effect As MSForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub UserForm_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean, ByVal Control As
MSForms
.Control, ByVal Action As MSForms.fmAction, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal
Y As Single, ByVal Effect As MSForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub UserForm_Click()
End Sub
Private Sub UserForm_DblClick(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub UserForm_Deactivate()
End Sub
Private Sub UserForm_Error(ByVal Number As Integer, ByVal Description As MSForms.ReturnString, ByVal S
Code As Long, ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, ByVal
CanceUserForm1 - 3
lDisplay As MSForms.ReturnBoolean)
End Sub
Private Sub UserForm_Initialize()
End Sub
Private Sub UserForm_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)
End Sub
Private Sub UserForm_Layout()
End Sub
Private Sub UserForm_MouseDown(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV
al Y As Single)
End Sub
Private Sub UserForm_MouseMove(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV
al Y As Single)
End Sub
Private Sub UserForm_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal
Y As Single)
End Sub
Private Sub UserForm_RemoveControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_Resize()
End Sub
Private Sub UserForm_Scroll(ByVal ActionX As MSForms.fmScrollAction, ByVal ActionY As MSForms.fmScroll
Action, ByVal RequestDx As Single, ByVal RequestDy As Single, ByVal ActualDx As MSForms.ReturnSingle,
ByVal ActualDy As MSForms.ReturnSingle)
End Sub
Private Sub UserForm_Terminate()
End Subregister academic engineering national trade certificate diploma engineering / system matter expert intelligence artificial .. data base
system education trade and vocational system theoretical base pratical base learning system information learner academic education
subject module mathematics
subject module engineering science
subject module engineering drawing
subject module engineering elctrical
subject module electrical trade theory
subject module industrial electronics
```

"txt _labell2 "=" true and lette
"txt _labell3 "=" true and letter entry "
"txt _labell4 "=" true and letter entry "
"txt _labell5 "=" true and letter entry "
"txt _labell6 "=" true and letter entry "
"txt _labell7 "=" true and letter entry "
subject module fault find
"txt _labell8 "=" true and letter entry "
subject module installer rules
electrical
subject module logic control
subject module logic system
subject module power machine
subject module information
management system / information
anangement document
subject module orientation industrial/
businnnes english
subject module supevisor industrial/
manangement supervisor
"txt _labell9 "=" true and letter entry
"txt _labell10"=" true and letter entry
"txt _labell11 "=" true and letter entr
"txt _labell12 "=" true and letter entr
"txt _labell14"=" true and letter entry
"txt _labell15 "=" true and letter entry
"txt _labell2 "=" true and letter entry "
subject module electrotech
subject electrotechnology
subject module
mechanotechnology. meactech
subject engineering civil building science , drawing building ,
carpentery
business / it module
outcome totoal career
electrical / power system,
generation transmission
Frame1
ok
cancel
next
Tab1 Tab2
Page1
Page2
"txt _labell2 "=" true and letter entry
ToggleButt
on1



UserForm4 - 1

Private Sub CommandButton1_Click()

End Sub

Private Sub CommandButton2_Click()

End Sub

Private Sub CommandButton3_Click()

End Sub

Private Sub Frame1_Click()

End Sub

Private Sub Frame2_Click()

End Sub

Private Sub Label1_Click()

End Sub

```
Private Sub Label10_Click()
End Sub
Private Sub Label11_Click()
End Sub
Private Sub Label3_Click()
End Sub
Private Sub Label5_Click()
End Sub
Private Sub Label6_Click()
End Sub
Private Sub Label7_Click()
End Sub
Private Sub Label8_Click()
End Sub
Private Sub Label9_Click()
End Sub
Private Sub MultiPage2_Change()
End Sub
Private Sub SpinButton2_Change()
End Sub
Private Sub TextBox1_Change()
End Sub
Private Sub TextBox2_Change()
End Sub
Private Sub TextBox3_Change()UserForm4 - 2
End Sub
Private Sub TextBox4_Change()
End Sub
Private Sub TextBox5_Change()
End Sub
Private Sub TextBox6_Change()
End Sub
```

```
Private Sub TextBox7_Change()

End Sub

Private Sub TextBox8_Change()

End Sub

Private Sub TextBox9_AfterUpdate()

End Sub

Private Sub TextBox9_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean, ByVal Data As
MSForms.DataO

bject, ByVal X As Single, ByVal Y As Single, ByVal DragState As MSForms.fmDragState, ByVal Effect As M

SForms.ReturnEffect, ByVal Shift As Integer)

End Sub

Private Sub TextBox9_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean, ByVal Action As
MSForms.

fmAction, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal Effect As MSFo

rms.ReturnEffect, ByVal Shift As Integer)

End Sub

Private Sub TextBox9_BeforeUpdate(ByVal Cancel As MSForms.ReturnBoolean)

End Sub

Private Sub TextBox9_Change()

End Sub

Private Sub TextBox9_DblClick(ByVal Cancel As MSForms.ReturnBoolean)

End Sub

Private Sub TextBox9_DropButtonClick()

End Sub

Private Sub TextBox9_Enter()

End Sub

Private Sub TextBox9_Exit(ByVal Cancel As MSForms.ReturnBoolean)

End Sub

Private Sub TextBox9_KeyDown(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)

End Sub

Private Sub TextBox9_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)

End Sub
```

Private Sub TextBox9_MouseDown(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal Y As Single)UserForm4 - 3

End Sub

Private Sub TextBox9_MouseMove(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal Y As Single)

End Sub

Private Sub TextBox9_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal Y As Single)

End Sub

Private Sub UserForm_Click()

End Subregister workplace log activity framework experimental theoretical base pratical industrial workplace trade and vocational career outcome workshop lab ,intelligence artificial expert matter training trainer system occupation

subject module lab workshop

subject module office workplace

subject outcome total

subject training career mentoring

"txt _labell2"="true and value"

"txt _labell3"="true and value"

"txt _labell4"="true and value"

"txt _labell4"="true and value"

Page1

Page2

"txt _labell2"="true and value" textbook catalogue , magazine trade text bulletin trade , salary ,low rules manufacture framewor qualification

custumer product trade and

vocationel

configuration trading product

"txt _labell5"="true and value"

"txt _labell6"="true and value"

product project customer

employment database

"txt _labell7"="true and value"

"txt _labell8"="true and value"

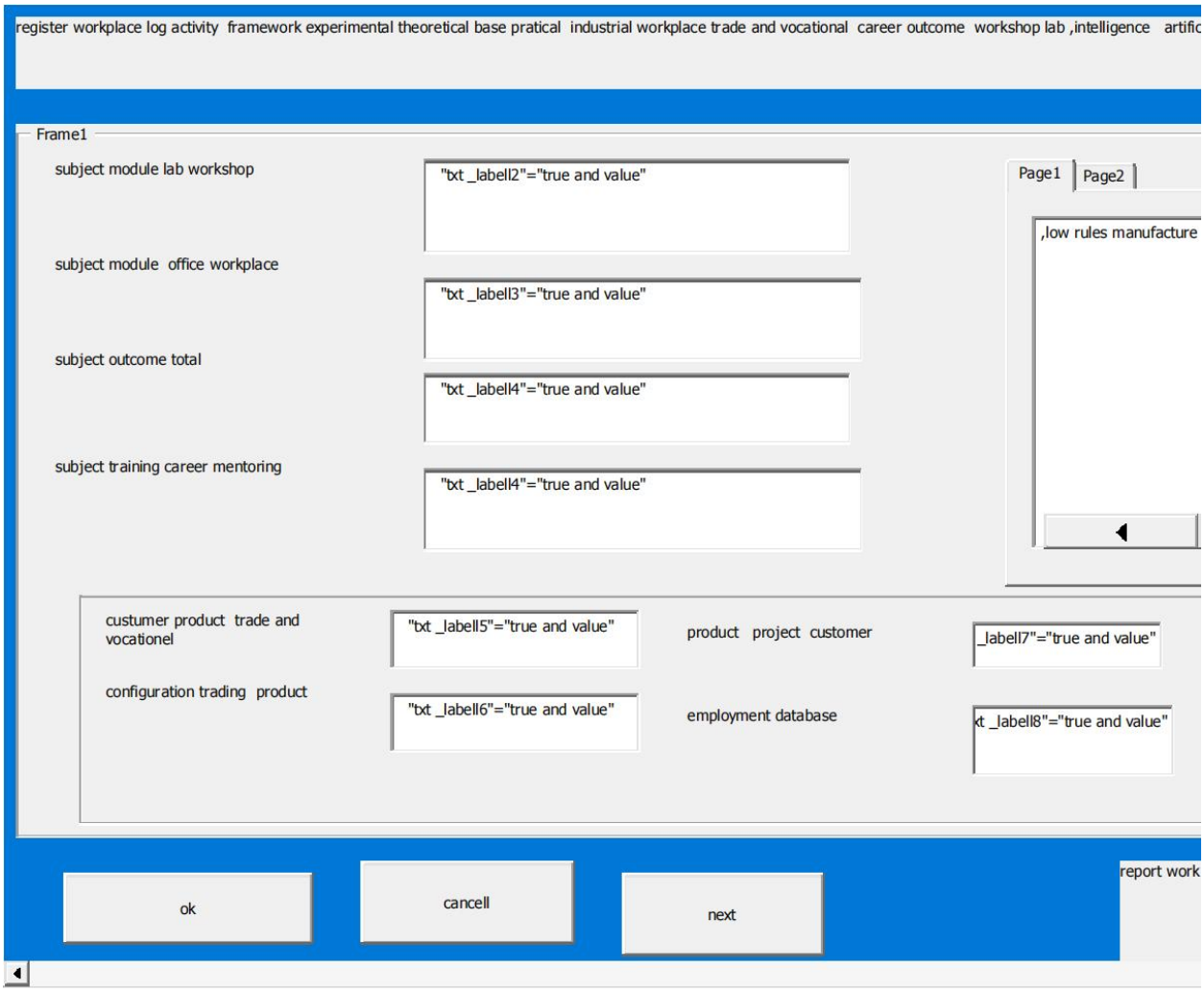
Frame1

ok

cancell

next

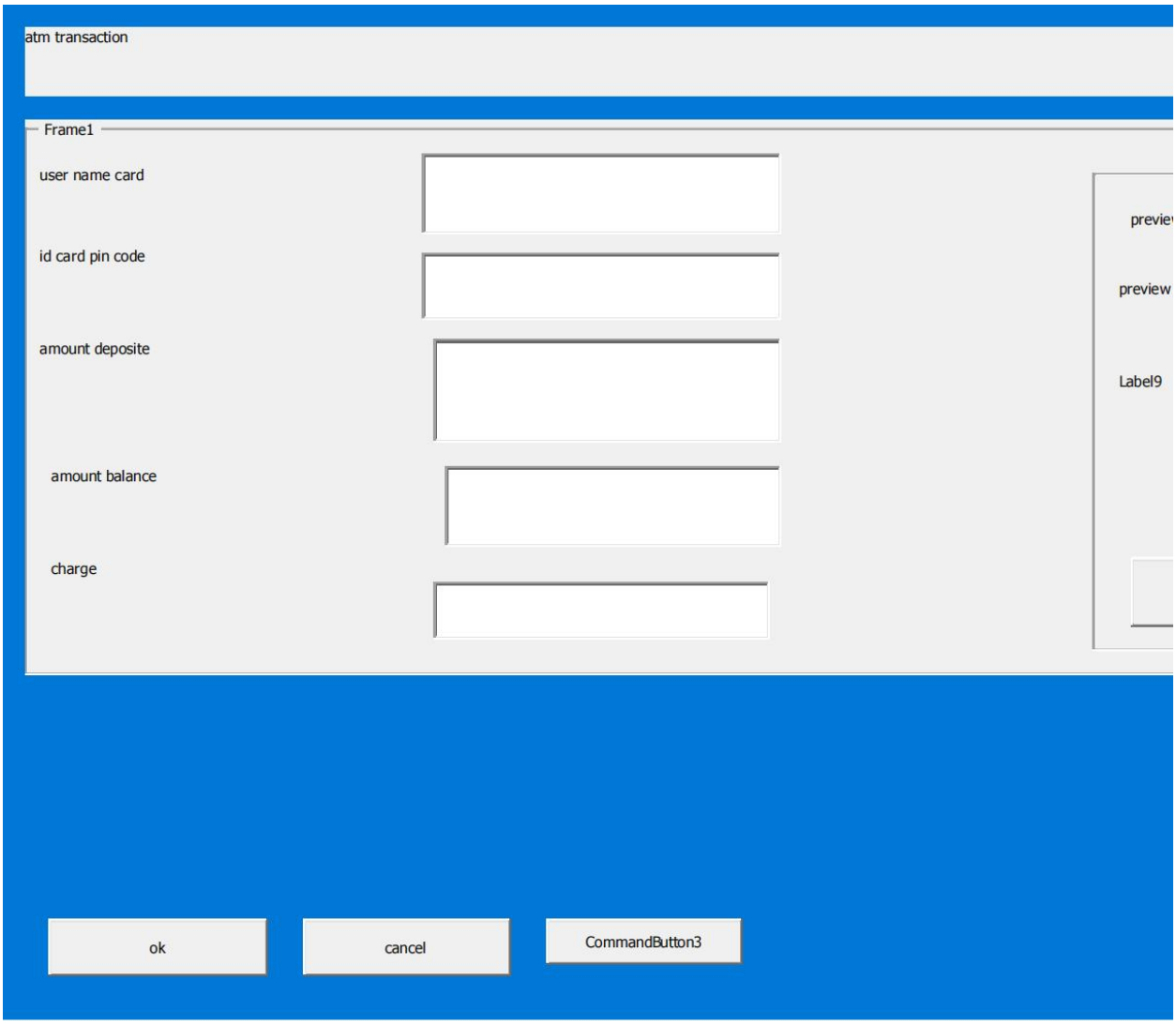
report work activity total subject training outcome and workshop lab office manufacture



UserForm15 - 1
Private Sub CommandButton1_Click()
End Sub
Private Sub CommandButton2_Click()
End Sub
Private Sub CommandButton3_Click()
End Sub
Private Sub CommandButton4_Click()
End Sub
Private Sub CommandButton5_Click()
End Sub
Private Sub Frame1_Click()
End Sub
Private Sub Frame2_Click()
End Sub
Private Sub Label2_Click()
End Sub
Private Sub Label3_Click()
End Sub
Private Sub Label6_Click()
End Sub
Private Sub Label8_Click()
End Sub
Private Sub Label9_Click()
End Sub
Private Sub TextBox1_Change()
End Sub
Private Sub TextBox2_Change()
End Sub
Private Sub TextBox3_Change()
End Sub
Private Sub TextBox5_Change()
End Sub
Private Sub TextBox6_Change()
End Sub
Private Sub TextBox7_Change()
End SubUserForm15 - 2
Private Sub TextBox8_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean, ByVal Data As MSForms.DataO
bject, ByVal X As Single, ByVal Y As Single, ByVal DragState As MSForms.fmDragState, ByVal Effect As M
SForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub TextBox8_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean, ByVal Action As MSForms.
fmAction, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal Effect As MSFo
rms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub TextBox8_Change()
End Sub
Private Sub TextBox8_DropButtonClick()
End Sub
Private Sub TextBox8_Enter()
End Sub
Private Sub TextBox8_Exit(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub TextBox8_KeyDown(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)

```
End Sub
Private Sub TextBox8_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)
End Sub
Private Sub TextBox8_KeyUp(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub TextBox8_MouseMove(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV
al Y As Single)
End Sub
Private Sub UserForm_Click()
Public Class transactionsGBox
Const SERVICE_CHARGE_DECIMAL As Decimal = 6.5
Const PIN As Integer = 9343
UserForm15 - 3
Dim Balance As Decimal = 150
Private Sub Label2_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles L
abel2.Click
End Sub
Private Sub RadioButton5_CheckedChanged(ByVal sender As System.Object, ByVal e As System.Event
Args) Handles topUpButton.CheckedChanged
End Sub
Private Sub transactionsGBox_Load(ByVal sender As System.Object, ByVal e As System.EventArgs)
Handles MyBase.Load
End Sub
UserForm15 - 4
Private Function withdraw(ByVal amount As Decimal)
Balance -= amount
Return Balance
End Function
Private Function deposit(ByRef amount As Decimal)
Balance += amount
Return Balance
UserForm15 - 5
End Function
Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles
clearButton1.Click
End Sub
Private Sub Button1_Click_1(ByVal sender As System.Object, ByVal e As System.EventArgs) Handle
s confirmButton.Click
If pinBox.Text = "9343" Then
transactionGroupBox.Enabled = True
previewButton.Enabled = True
proceedButton.Enabled = True
pinBox.Enabled = False
UserForm15 - 6
Else
MessageBox.Show("Incorrect pin, try again", "Pin Error", MessageBoxButtons.OK, Message
BoxIcon.Exclamation)
End If
End Sub
Private Sub Label4_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles L
abel4.Click
End Sub
Private Sub Button2_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles
clearButton2.Click
End Sub
UserForm15 - 7
```

```
Private Sub exitButton_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handl
es exitButton.Click
Me.Close()
End Sub
Private Sub previewButton_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Ha
ndles previewButton.Click
If depositButton.Checked = True Then
previewBalance.Text = deposit(transactionValueBox.Text)
Else
previewBalance.Text = withdraw(transactionValueBox.Text)
UserForm15 - 8
End If
End Sub
Private Sub proceedButton_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Ha
ndles proceedButton.Click
If depositButton.Checked = True Then
finalBalance.Text = deposit(transactionValueBox.Text)
Else
finalBalance.Text = withdraw(transactionValueBox.Text)
End If
UserForm15 - 9
End Sub
End Class
End Subatm transaction
preview balance
preview balance
Label9
user name card
id card pin code
amount deposite
amount balance
charge
Frame1
ok
cancel
CommandButton3
```



UserForm6 - 1
Private Sub Frame1_Click()
End Sub
Private Sub Label1_Click()
End Sub
Private Sub Label10_Click()
End Sub
Private Sub Label11_Click()
End Sub
Private Sub Label12_Click()
End Sub

```
Private Sub Label13_Click()
End Sub
Private Sub Label14_Click()
End Sub
Private Sub Label15_Click()
End Sub
Private Sub Label16_Click()
End Sub
Private Sub Label17_Click()
End Sub
Private Sub Label18_Click()
End Sub
Private Sub Label19_Click()
End Sub
Private Sub Label2_Click()
End Sub
Private Sub Label3_Click()
End Sub
Private Sub Label4_Click()
End Sub
Private Sub Label5_Click()
End Sub
Private Sub Label6_Click()
End Sub
Private Sub Label7_Click()
End Sub
Private Sub Label8_Click()UserForm6 - 2
End Sub
Private Sub Label9_Click()
End Sub
Private Sub ListBox1_Click()
End Sub
Private Sub OptionButton1_Click()
End Sub
Private Sub OptionButton2_Click()
End Sub
Private Sub TextBox1_Change()
End Sub
Private Sub TextBox3_Change()
End Sub
Private Sub TextBox5_Change()
End Sub
Private Sub TextBox7_Change()
End Sub
Private Sub UserForm_Activate()
End Sub
Private Sub UserForm_AddControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean, ByVal Control As
MSForms.Co
ntrol, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal State As MSForms.
fmDragState, ByVal Effect As MSForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub UserForm_Click()
End Sub
Private Sub UserForm_Deactivate()
```

```
End Sub
Private Sub UserForm_Initialize()
End Sub
Private Sub UserForm_Layout()
End Sub
Private Sub UserForm_MouseMove(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV
al Y As Single)
End Sub
Private Sub UserForm_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal
Y As Single)UserForm6 - 3
End Sub
Private Sub UserForm_RemoveControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_Resize()
End Sub
Private Sub UserForm_Scroll(ByVal ActionX As MSForms.fmScrollAction, ByVal ActionY As MSForms.fmScroll
Action, ByVal RequestDx As Single, ByVal RequestDy As Single, ByVal ActualDx As MSForms.ReturnSingle,
ByVal ActualDy As MSForms.ReturnSingle)
End Sub
Private Sub UserForm_Terminate()
End Sub
Private Sub UserForm_Zoom(Percent As Integer)
Application.ScreenUpdating = False
Dim sDate As String
On Error Resume Next
sDate = MyCalendar.DatePicker(Me.txtDOB)
Me.txtDOB.Value = Format(sDate, "dd-mmm-yyyy")
On Error GoTo 0
Application.ScreenUpdating = True
End Sub
Private Sub imgCalendar_Click()
Application.ScreenUpdating = False
Dim sDate As String
On Error Resume Next
sDate = MyCalendar.DatePicker(Me.txtDOB)
Me.txtDOB.Value = Format(sDate, "dd-mmm-yyyy")
Sub Reset_Form()
Dim iRow As Long
With frmDataEntry
.txtStudentName.Text = ""
.txtStudentName.BackColor = vbWhite
.txtFatherName.Text = ""
.txtFatherName.BackColor = vbWhite
.txtDOB.Text = ""
.txtDOB.BackColor = vbWhite
.optFemale.Value = False
.optMale.Value = False
.txtMobile.Value = ""
.txtMobile.BackColor = vbWhite
.txtEmail.Value = ""
.txtEmail.BackColor = vbWhiteUserForm6 - 4
.txtAddress.Value = ""
.txtAddress.BackColor = vbWhite
.txtRowNumber.Value = ""
.txtImagePath.Value = ""
.imgStudent.Picture = LoadPicture(vbNullString)
```

```
.cmdSubmit.Caption = "Submit"
'.cmbCourse.Clear
.cmbCourse.BackColor = vbWhite
'Dynamic range based on Support Sheet
shSupport.Range("A2", shSupport.Range("A" & Rows.Count).End(xlUp)).Name = "Dynamic"
.cmbCourse.RowSource = "Dynamic"
.cmbCourse.Value = ""
.cmbCourse.Value = ""
'Assigning RowSource to lstDatabase
.lstDatabase.ColumnCount = 12
.lstDatabase.ColumnHeads = True
.lstDatabase.ColumnWidths = "30,70,70,40,45,70,60,60,70,0,0,0"
iRow = shDatabase.Range("A" & Rows.Count).End(xlUp).row + 1 ' Identify last blank row
If iRow > 1 Then
.lstDatabase.RowSource = "Database!A2:L" & iRow
Else
.lstDatabase.RowSource = "Database!A2:L2"
End If
End With
End Sub
On Error GoTo 0
Application.ScreenUpdating = True
Set oRegEx = CreateObject("VBScript.RegExp")
With oRegEx
.Pattern = "^[\w-\.]{1,}\@([\da-zA-Z-]{1,}\.){1,}[\da-zA-Z-]{2,3}$"
ValidEmail = .Test(Email)
End With
Set oRegEx = Nothing
GetImagePath = ""
With Application.FileDialog(msoFileDialogFilePicker) ' File Picker Dialog box
.AllowMultiSelect = False
.Filters.Clear ' Clear the exisiting filters
.Filters.Add "Images", "*.gif; *.jpg; *.jpeg" 'Add a filter that includes GIF and JPEG images
' show the file picker dialog box
If .Show <> 0 Then
GetImagePath = .SelectedItems(1) ' Getting the path of selected file name
End If
End With
End FunctionUserForm6 - 5
Sub CreateFolder()
Dim strFolder As String ' To hold the folter path where we need to replicate the image
strFolder = ThisWorkbook.Path & Application.PathSeparator & "Images"
'Check Directory exist or not. If not exist then it will return blank
If Dir(strFolder, vbDirectory) = "" Then
MkDir strFolder ' Make a folder with the name of 'Images'
End If
End Sub
Sub LoadImange()
Dim imgSourcePath As String ' To store the path of image selected by user
Dim imgDestination As String ' To store the path of image selected by user
imgSourcePath = Trim(GetImagePath()) ' Call the Function
If imgSourcePath = "" Then Exit Sub
Call CreateFolder 'Create Image folder if not exist
imgDestination = ThisWorkbook.Path & Application.PathSeparator & _
frmDataEntry.txtStudentName & "." & Split(imgSourcePath, ".")(UBound(Split(imgSourcePath, ".")))
FileCopy imgSourcePath, imgDestination ' Code to copy image
```

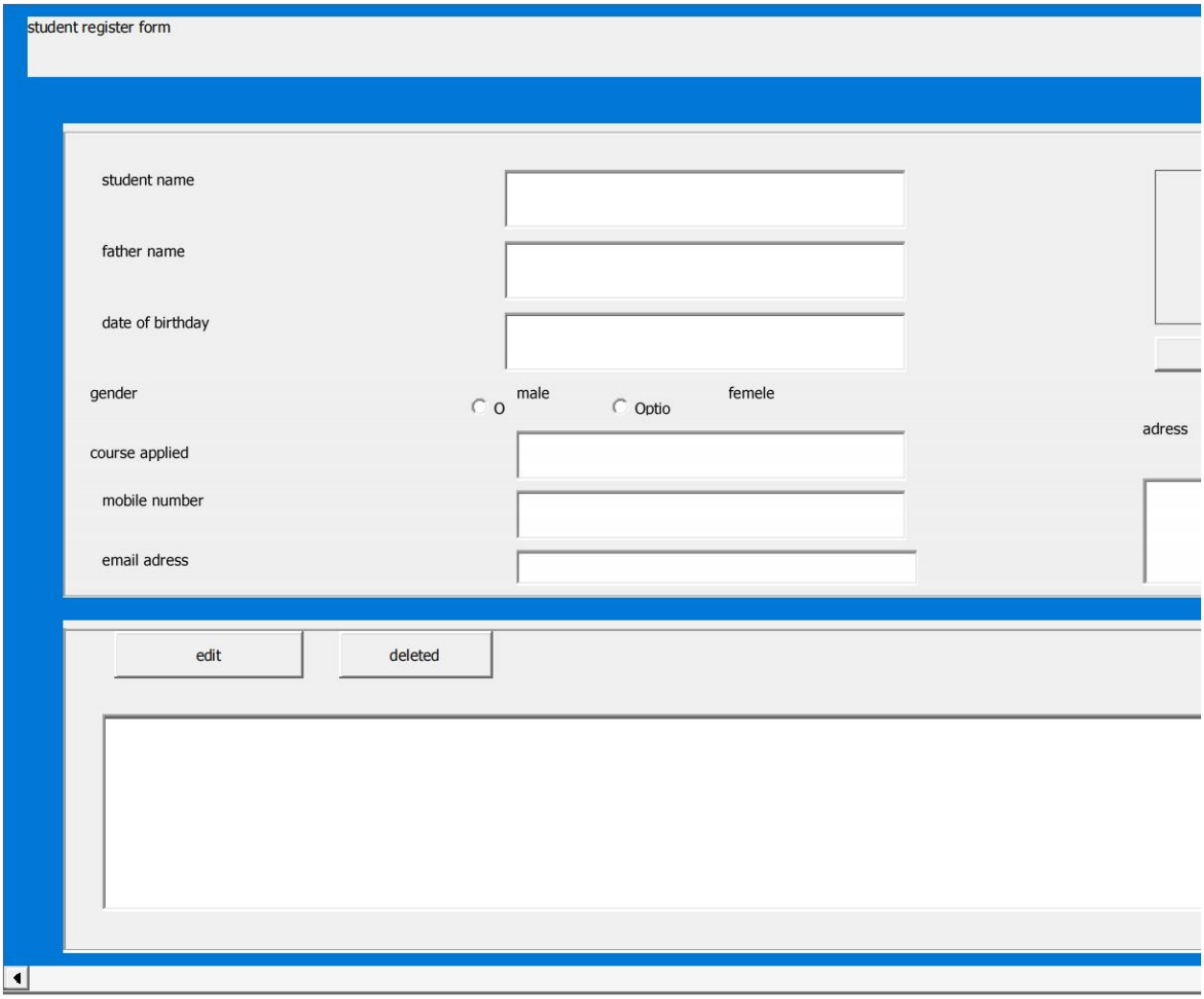
```
frmDataEntry.imgStudent.PictureSizeMode = fmPictureSizeModeStretch 'Stretch mode
frmDataEntry.imgStudent.Picture = LoadPicture(imgDestination) ' Loading picture to imgStudent
frmDataEntry.txtImagePath.Value = imgDestination ' Assigning the path to text boxFunction ValidEntry()
As Boolean
ValidEntry = True
With frmDataEntry
'Default Color
.txtStudentName.BackColor = vbWhite
.txtFatherName.BackColor = vbWhite
.txtDOB.BackColor = vbWhite
.txtMobile.BackColor = vbWhite
.txtEmail.BackColor = vbWhite
.txtAddress.BackColor = vbWhite
.cmbCourse.BackColor = vbWhite
'Validating Student Name
If Trim(.txtStudentName.Value) = "" Then
MsgBox "Please enter Student's name.", vbOKOnly + vbInformation, "Student Name"
.txtStudentName.BackColor = vbRed
.txtStudentName.SetFocus
ValidEntry = False
Exit Function
End If
'Validating Father's name
If Trim(.txtFatherName.Value) = "" Then
MsgBox "Please enter Father's name.", vbOKOnly + vbInformation, "Father Name"
.txtFatherName.BackColor = vbRed
.txtFatherName.SetFocus
ValidEntry = False
Exit Function
End If
'Validating DOB
If Trim(.txtDOB.Value) = "" Then
MsgBox "DOB is blank. Please enter DOB.", vbOKOnly + vbInformation, "Invalid Entry"
.txtDOB.BackColor = vbRed
ValidEntry = FalseUserForm6 - 6
Exit Function
End If
'Validating Gender
If .optFemale.Value = False And .optMale.Value = False Then
MsgBox "Please select gender.", vbOKOnly + vbInformation, "Invalid Entry"
ValidEntry = False
Exit Function
End If
'Validating Course
If Trim(.cmbCourse.Value) = "" Then
MsgBox "Please select the Course from drop-down.", vbOKOnly + vbInformation, "Course Applied"
.cmbCourse.BackColor = vbRed
ValidEntry = False
Exit Function
End If
'Validating Mobile Number
If Trim(.txtMobile.Value) = "" Or Len(.txtMobile.Value) < 10 Or Not IsNumeric(.txtMobile.Value) Th
en
MsgBox "Please enter a valid mobile number.", vbOKOnly + vbInformation, "Invalid Entry"
.txtMobile.BackColor = vbRed
.txtMobile.SetFocus
```

```
ValidEntry = False
Exit Function
End If
'Validating Email
If ValidEmail(Trim(.txtEmail.Value)) = False Then
MsgBox "Please enter a valid email address.", vbOKOnly + vbInformation, "Invalid Entry"
.txtEmail.BackColor = vbRed
.txtEmail.SetFocus
ValidEntry = False
Exit Function
End If
'Validating Address
If Trim(.txtAddress.Value) = "" Then
MsgBox "Address is blank. Please enter a valid address.", vbOKOnly + vbInformation, "Invalid E
ntry"
.txtAddress.BackColor = vbRed
ValidEntry = False
Exit Function
End If
'Validating Image
If .imgStudent.Picture Is Nothing Then
MsgBox "Please upload the PP Size Photo.", vbOKOnly + vbInformation, "Picture"
ValidEntry = False
Exit Function
End If
End With
End Function
Sub Submit_Data()
Dim iRow As Long
If frmDataEntry.txtRowNumber.Value = "" Then
iRow = shDatabase.Range("A" & Rows.Count).End(xlUp).row + 1 ' Identify last blank row
ElseUserForm6 - 7
iRow = frmDataEntry.txtRowNumber.Value
End If
With shDatabase.Range("A" & iRow)
.Offset(0, 0).Value = "=Row()-1" 'S. No.
.Offset(0, 1).Value = frmDataEntry.txtStudentName.Value 'Student's Name
.Offset(0, 2).Value = frmDataEntry.txtFatherName.Value 'Father's Name
.Offset(0, 3).Value = frmDataEntry.txtDOB.Value 'DOB
.Offset(0, 4).Value = IIf(frmDataEntry.optFemale.Value = True, "Female", "Male") 'Gender
.Offset(0, 5).Value = frmDataEntry.cmbCourse.Value 'Qualification
.Offset(0, 6).Value = frmDataEntry.txtMobile.Value 'Mobile Number
.Offset(0, 7).Value = frmDataEntry.txtEmail.Value 'Email
.Offset(0, 8).Value = frmDataEntry.txtAddress.Value 'Address
.Offset(0, 9).Value = frmDataEntry.txtImagePath.Value 'Photo
.Offset(0, 10).Value = Application.UserName 'Submitted By
.Offset(0, 11).Value = Format([Now()], "DD-MMM-YYYY HH:MM:SS") 'Submitted On
'Reset the form
Call Reset_Form
Application.ScreenUpdating = True
MsgBox "Data submitted successfully!"
End Sub
Function Selected_List() As Long
Dim i As Long
Selected_List = 0
If frmDataEntry.lstDatabase.ListCount = 1 Then Exit Function ' If no items exist in List Box
```

```
For i = 0 To frmDataEntry.lstDatabase.ListCount - 1
If frmDataEntry.lstDatabase.Selected(i) = True Then
Selected_List = i + 1
Exit For
End If
Next i
End Function
End Function
Sub Show_Form()
frmDataEntry.Show
End Sub
Private Sub cmdLoadImage_Click()
If Me.txtStudentName.Value = "" Then
MsgBox "Please enter Student's first.", vbOKOnly + vbCritical, "Error"
Exit Sub
End If
Call LoadImange
End Sub
Private Sub UserForm6_Initialize()
Call Reset_Form
End SubUserForm6 - 8
Private Sub cmdSubmit_Click()
Dim i As VbMsgBoxResult
i = MsgBox("Do you want to submit the data?", vbYesNo + vbQuestion, "Submit Data")
If i = vbNo Then Exit Sub
If ValidEntry Then
Call Submit_Data
End If
End Sub
Private Sub cmdReset_Click()
Dim i As VbMsgBoxResult
i = MsgBox("Do you want to reset the form?", vbYesNo + vbQuestion, "Reset")
If i = vbNo Then Exit Sub
Call Reset_Form
End Sub
Private Sub lstDatabase_DblClick(ByVal Cancel As MSForms.ReturnBoolean)
If Selected_List = 0 Then
MsgBox "No row is selected.", vbOKOnly + vbInformation, "Edit"
Exit Sub
End If
Dim sGender As String
'Me.txtRowNumber = Selected_List + 1 ' Assigning Selected Row Number of Database Sheet
Me.txtRowNumber = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 0) + 1
'Assigning the Selected Reocords to Form controls
frmDataEntry.txtStudentName.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 1)
frmDataEntry.txtFatherName.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 2)
frmDataEntry.txtDOB.Value = Format(Me.lstDatabase.List(Me.lstDatabase.ListIndex, 3), "dd-mmm-yyyy")
sGender = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 4)
If sGender = "Female" Then
frmDataEntry.optFemale.Value = True
Else
frmDataEntry.optMale.Value = True
End If
frmDataEntry.cmbCourse.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 5)
frmDataEntry.txtMobile.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 6)
frmDataEntry.txtEmail.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 7)
```

```
frmDataEntry.txtAddress.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 8)
frmDataEntry.imgStudent.Picture = LoadPicture(Me.lstDatabase.List(Me.lstDatabase.ListIndex, 9))
frmDataEntry.txtImagePath = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 9)
Me.cmdSubmit.Caption = "Update"
MsgBox "Please make the required changes and Click on Update."
End Sub
Private Sub cmdDelete_Click()
If Selected_List = 0 Then
MsgBox "No row is selected.", vbOKOnly + vbInformation, "Delete"UserForm6 - 9
Exit Sub
End If
Dim i As VbMsgBoxResult
Dim row As Long
row = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 0) + 1
i = MsgBox("Do you want ot delete the selected record?", vbYesNo + vbQuestion, "Delete")
If i = vbNo Then Exit Sub
ThisWorkbook.Sheets("Database").Rows(row).Delete
Call Reset ' Refresh the controls with latest information
MsgBox "Selected record has been successfully deleted.", vbOKOnly + vbInformation, "Delete"
End Sub
Private Sub cmdEdit_Click()
If Selected_List = 0 Then
MsgBox "No row is selected.", vbOKOnly + vbInformation, "Edit"
Exit Sub
End If
Dim sGender As String
Me.txtRowNumber = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 0) + 1
'Assigning the Selected Reocords to Form controls
frmDataEntry.txtStudentName.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 1)
frmDataEntry.txtFatherName.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 2)
frmDataEntry.txtDOB.Value = Format(Me.lstDatabase.List(Me.lstDatabase.ListIndex, 3), "dd-mmm-yyyy")
sGender = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 4)
If sGender = "Female" Then
frmDataEntry.optFemale.Value = True
Else
frmDataEntry.optMale.Value = True
End If
frmDataEntry.cmbCourse.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 5)
frmDataEntry.txtMobile.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 6)
frmDataEntry.txtEmail.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 7)
frmDataEntry.txtAddress.Value = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 8)
frmDataEntry.imgStudent.Picture = LoadPicture(Me.lstDatabase.List(Me.lstDatabase.ListIndex, 9))
frmDataEntry.txtImagePath = Me.lstDatabase.List(Me.lstDatabase.ListIndex, 9)
Me.cmdSubmit.Caption = "Update"
MsgBox "Please make the required changes and Click on Update."student register form
student name
father name
date of birthday
O
Optio
course applied
mobile number
email adress
adress
femele
male
gender
edit
deleted
```

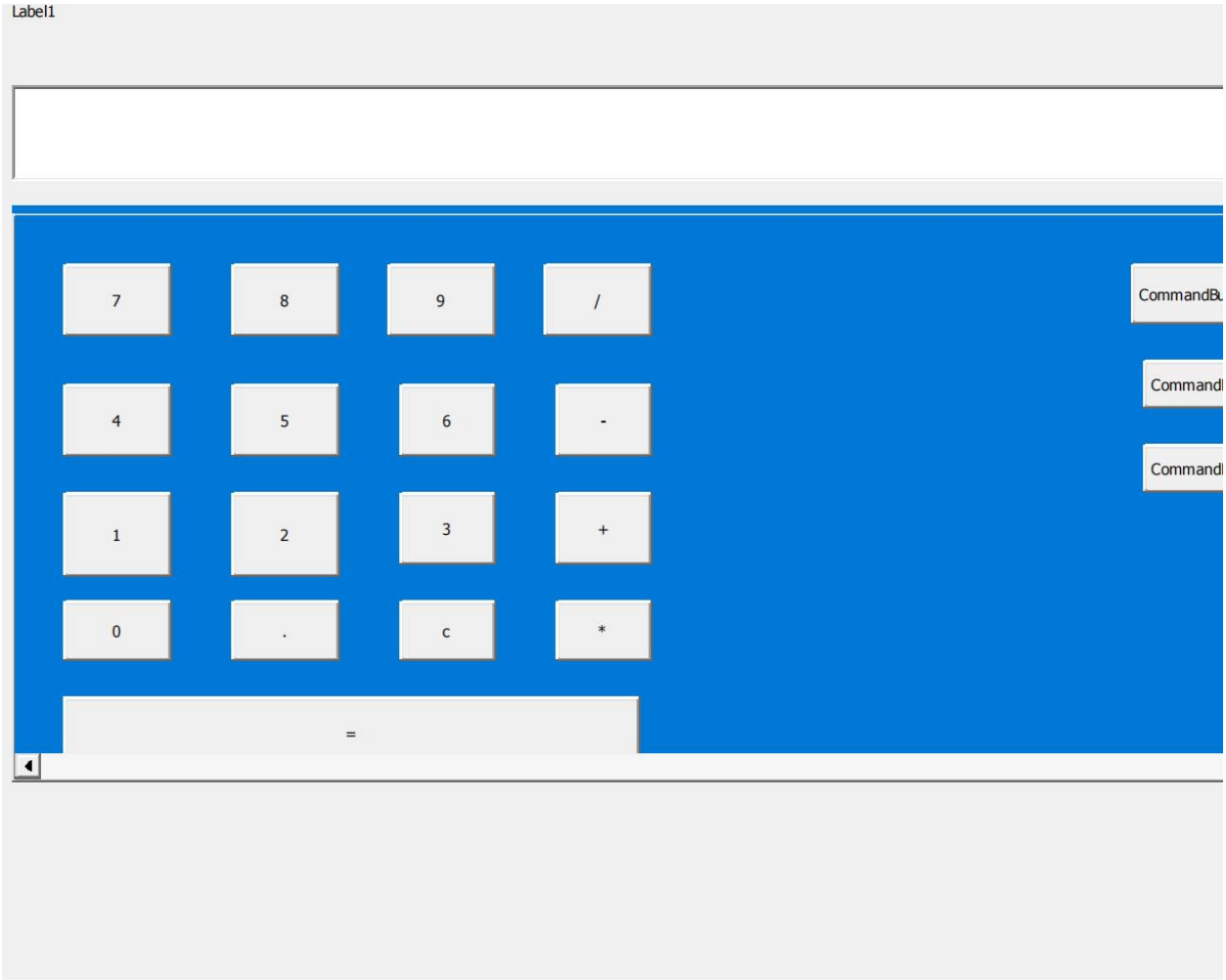
student name
father name
date of birth day
gender
course applied



UserForm13 - 1
```
Private Sub CommandButton1_Click()
End Sub
Private Sub CommandButton10_Click()
End Sub
Private Sub CommandButton11_Click()
End Sub
Private Sub CommandButton12_Click()
End Sub
Private Sub CommandButton13_Click()
End Sub
Private Sub CommandButton14_Click()
End Sub
Private Sub CommandButton15_Click()
End Sub
Private Sub CommandButton16_Click()
End Sub
Private Sub CommandButton17_Click()
End Sub
Private Sub CommandButton18_Click()
End Sub
Private Sub CommandButton2_Click()
End Sub
Private Sub CommandButton20_Click()
End Sub
Private Sub CommandButton22_Click()
End Sub
Private Sub CommandButton23_Click()
End Sub
Private Sub CommandButton3_Click()
End Sub
Private Sub CommandButton4_Click()
End Sub
Private Sub CommandButton5_Click()
End Sub
Private Sub CommandButton6_Click()
End SubUserForm13 - 2
Private Sub CommandButton8_Click()
End Sub
Private Sub CommandButton9_Click()
End Sub
Private Sub Frame1_Click()
End Sub
Private Sub Label1_Click()
End Sub
Private Sub TextBox1_Change()
End Sub
Private Sub UserForm_Activate()
End Sub
Private Sub UserForm_AddControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean, ByVal Control As
MSForms.Co
ntrol, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal State As MSForms.
fmDragState, ByVal Effect As MSForms.ReturnEffect, ByVal Shift As Integer)
End Sub
```

```
Private Sub UserForm_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean, ByVal Control As
MSForms
.Control, ByVal Action As MSForms.fmAction, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal
Y As Single, ByVal Effect As MSForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub UserForm_Click()
End Sub
Private Sub UserForm_DblClick(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub UserForm_Deactivate()
End Sub
Private Sub UserForm_Error(ByVal Number As Integer, ByVal Description As MSForms.ReturnString, ByVal S
Code As Long, ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, ByVal Cance
lDisplay As MSForms.ReturnBoolean)
End Sub
Private Sub UserForm_KeyDown(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub UserForm_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)
End Sub
Private Sub UserForm_KeyUp(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub UserForm_MouseDown(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV
al Y As Single)UserForm13 - 3
End Sub
Private Sub UserForm_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal
Y As Single)
End Sub
Private Sub UserForm_QueryClose(Cancel As Integer, CloseMode As Integer)
End Sub
Private Sub UserForm_RemoveControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_Resize()
End Sub
Private Sub UserForm_Scroll(ByVal ActionX As MSForms.fmScrollAction, ByVal ActionY As MSForms.fmScroll
Action, ByVal RequestDx As Single, ByVal RequestDy As Single, ByVal ActualDx As MSForms.ReturnSingle,
ByVal ActualDy As MSForms.ReturnSingle)
End Sub
Private Sub UserForm_Terminate()
End Sub
Private Sub UserForm_Zoom(Percent As Integer)
End Sub this.textBox1.Text = "";
this.input = string.Empty;
this.operand1 = string.Empty;
this.operand2 = string.Empty;operand2 = input;
double num1, num2;
double.TryParse(operand1, out num1);
double.TryParse(operand2, out num2);
if (operation == '+')
{
result = num1 + num2;
textBox1.Text = result.ToString();
}
else if (operation == '-')
{
result = num1 - num2;
textBox1.Text = result.ToString();
```

```
}
else if (operation == '*')
{
result = num1 * num2;
textBox1.Text = result.ToString();
}
else if (operation == '/')
{
if (num2 != 0)
{
result = num1 / num2;
textBox1.Text = result.ToString();
}
Else
{
textBox1.Text = "DIV/Zero!";
} textBox1.Text = result.ToString();
}
Result = num1 + num2Label1
7
8
9
/
4
5
6
-
1
2
3
+
0
.
c
*
=
CommandButto
CommandButton21
CommandBut
```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UserForm16 - 1
Private Sub Label1_Click()
End Sub
Private Sub Label17_Click()
End Sub
Private Sub Label6_Click()
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Private Sub Label7_Click()
End Sub
Private Sub Label8_Click()
End Sub
Private Sub Label9_Click()
End Sub
Private Sub ListBox1_Click()
End Sub
Private Sub MultiPage1_Change()
End Sub
Private Sub MultiPage2_Change()
End Sub
Private Sub ScrollBar1_Change()
End Sub
Private Sub SpinButton1_Change()
End Sub
Private Sub TabStrip1_Change()
End Sub
Private Sub TextBox1_Change()
End Sub
Private Sub TextBox10_Change()
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Private Sub TextBox11_Change()
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Private Sub TextBox12_Change()
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Private Sub TextBox13_Change()
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Private Sub TextBox15_Change()
End Sub
Private Sub TextBox16_Change()UserForm16 - 2
End Sub
Private Sub TextBox17_Change()
End Sub
Private Sub TextBox18_Change()
End Sub
Private Sub TextBox19_Change()
End Sub
Private Sub TextBox2_Change()
End Sub
Private Sub TextBox3_Change()
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Private Sub TextBox4_Change()
End Sub
Private Sub TextBox6_Change()
End Sub
Private Sub TextBox7_Change()
End Sub
Private Sub TextBox8_Change()

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End Sub
Private Sub TextBox9_Change()
End Sub
Private Sub UserForm_AddControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean, ByVal Control As MSForms
.Control, ByVal Action As MSForms.fmAction, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal Effect As MSForms.ReturnEffect, ByVal Shift As Integer)
End Sub
Private Sub UserForm_Click()
End Sub
Private Sub UserForm_Deactivate()
End Sub
Private Sub UserForm_Error(ByVal Number As Integer, ByVal Description As MSForms.ReturnString, ByVal S Code As Long, ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, ByVal Cance lDisplay As MSForms.ReturnBoolean)
End Sub
Private Sub UserForm_KeyDown(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub UserForm_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)UserForm16 - 3
End Sub
Private Sub UserForm_Layout()
End Sub
Private Sub UserForm_MouseDown(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV al Y As Single)
End Sub
Private Sub UserForm_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal Y As Single)
End Sub
Private Sub UserForm_RemoveControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_Resize()
End Sub
Private Sub UserForm_Terminate()
End Sub
Private Sub UserForm_Zoom(Percent As Integer)
End Sub
Function K_Rdiv1(R1, R2)
' Gain of resistor divider
K_Rdiv1 = R2 / (R2 + R1)
End FunctionFunction Tri_Wave(t, V1, V2, T1, T2)
' ************************************************************
' Generate Triangle Wave
'
' t - time
' V1 - voltage level 1 (initial voltage)
' V2 - voltage level 2
' T1 - period ramping from V1 to V2
' T2 - period ramping from V2 to V1
'************************************************************
Dim t_tri, dV_dt1, dV_dt2 As Double
Dim N As Single
' Calculate voltage rates of change (slopes) during T1 and T2
dV_dt1 = (V2 - V1) / T1
dV_dt2 = (V1 - V2) / T2
```

```
' given t, how many full cycles have occurred
N = Application.WorksheetFunction.Floor(t / (T1 + T2), 1)
' calc the time point in the current triangle wave
t_tri = t - (T1 + T2) * N
' if during T1, calculate triangle value using V1 and dV_dt1
If t_tri <= T1 Then
Tri_Wave = V1 + dV_dt1 * t_tri
' if during T2, calculate triangle value using V2 and dV_dt2
Else
Tri_Wave = V2 + dV_dt2 * (t_tri - T1)
End If
given t, how many full cycles have occured
N = Application.WorksheetFunction.Floor(t / (T1 + T2), 1)
' calc the time point in the current triangle waveUserForm16 - 4
t_tri = t - (T1 + T2) * N
End FunctionIf t_tri <= T1 ThenElse
Tri_Wave = V2 + dV_dt2 * (t_tri - T1)
Tri_Wave = V1 + dV_dt1 * t_tri
Function K_op_non(R1, R2)
' Op amp closed loop gain - non-inverting amplifier
K_op_non = (R2 + R1) / R1
End Function
Function SineWave(t, Vp, fo, Phase, Vdc)
' create sine wave
' phase in deg
Dim pi As Double
pi = 3.1415927
'Calc sine wave
SineWave = Vp * Sin(2 * pi * fo * t + Phase * pi / 180) + Vdc
End Function
Function K_op_inv(R1, R2)
' Op amp closed loop gain - inverting amplifier
K_op_inv = -R2 / R1
End Functionn
```

Create custom VBA functions and algorithms.
Increase your understanding of electronic circuit design and analysis.
Explore topics such as basic circuits, waveform generators, ADCs, op amps, the Fourier Series and filters.
voltage Vs
voltage v1
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voltage v0
verror
error
t1
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t2
vp
vdc
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Page1
Page2
Page1 Page2
Tab1
Tab2

inverter non inverter The gain (K = vo/vs) for each of these amp
ok
cancell
next read

UserForm17 - 1

```
Private Sub Label4_Click()

End Sub

Private Sub TextBox16_Change()

End Sub

Private Sub TextBox17_Change()

End Sub

Private Sub TextBox18_Change()

End Sub

Private Sub TextBox19_Change()

End Sub

Private Sub TextBox2_Change()

End Sub

Private Sub TextBox20_Change()

End Sub

Private Sub TextBox21_Change()

End Sub

Private Sub TextBox23_Change()

End Sub

Private Sub TextBox24_Change()

End Sub

Private Sub TextBox26_Change()

End Sub

Private Sub TextBox27_Change()

End Sub

Private Sub TextBox29_Change()

End Sub
```

```
Private Sub TextBox3_Change()

End Sub

Private Sub TextBox31_Change()

End Sub

Private Sub TextBox33_Change()

End Sub

Private Sub TextBox35_Change()

End Sub

Private Sub TextBox36_Change()

End Sub

Private Sub TextBox5_Change()UserForm17 - 2

End Sub

Private Sub TextBox7_Change()

End Sub

Private Sub TextBox8_Change()

End Sub

Private Sub TextBox9_Change()

End Sub

Private Sub UserForm_Activate()

End Sub

Private Sub UserForm_AddControl(ByVal Control As MSForms.Control)

End Sub

Private Sub UserForm_BeforeDragOver(ByVal Cancel As MSForms.ReturnBoolean, ByVal Control As MSForms.Co

ntrol, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal Y As Single, ByVal State As MSForms.

fmDragState, ByVal Effect As MSForms.ReturnEffect, ByVal Shift As Integer)

End Sub

Private Sub UserForm_BeforeDropOrPaste(ByVal Cancel As MSForms.ReturnBoolean, ByVal Control As MSForms

.Control, ByVal Action As MSForms.fmAction, ByVal Data As MSForms.DataObject, ByVal X As Single, ByVal

Y As Single, ByVal Effect As MSForms.ReturnEffect, ByVal Shift As Integer)

End Sub
```

```
Private Sub UserForm_Click()
End Sub
Private Sub UserForm_DblClick(ByVal Cancel As MSForms.ReturnBoolean)
End Sub
Private Sub UserForm_Deactivate()
End Sub
Private Sub UserForm_Error(ByVal Number As Integer, ByVal Description As MSForms.ReturnString, ByVal S
Code As Long, ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, ByVal Cance
lDisplay As MSForms.ReturnBoolean)
End Sub
Private Sub UserForm_Initialize()
End Sub
Private Sub UserForm_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)
End Sub
Private Sub UserForm_KeyUp(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)
End Sub
Private Sub UserForm_MouseDown(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByV
al Y As Single)
End Sub
Private Sub UserForm_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal
Y As Single)UserForm17 - 3
End Sub
Private Sub UserForm_RemoveControl(ByVal Control As MSForms.Control)
End Sub
Private Sub UserForm_Scroll(ByVal ActionX As MSForms.fmScrollAction, ByVal ActionY As MSForms.fmScroll
Action, ByVal RequestDx As Single, ByVal RequestDy As Single, ByVal ActualDx As MSForms.ReturnSingle,
ByVal ActualDy As MSForms.ReturnSingle)
End Sub
Private Sub UserForm17_Terminate()
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End Subtshingombe fiston
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Web-Based Crime Management System for Samara City Main Police Station

Demelash Lemmi Ettisa1, Minota Milkias2

Abstract

Crime is a human experience, and it must be controlled. The Samara town police station plays a signifi

cant role in controlling crime. However, the management of crime activities is done manually, which is due to the lack of an automated system that supports the station workers in communicating with citize ns to share information and store, retrieve, and manage crime activities. To control crime efficiently , we need to develop online crime management systems.

This project, entitled "Web-Based Crime Management System," is designed to develop an online applicati on in which any citizen can report crimes; if anybody wants to file a complaint against crimes, they m ust enjoy online communication with the police. This project provides records of crimes that have led UserForm17 - 4

to disciplinary cases in addition to being used to simply retrieve information from the database. The system implemented is a typical web-based crime record management system based on client-server archit ecture, allowing data storage and crime record interchange with police stations.

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Chapter One

1. Introduction to the Study

The "Crime Management System" is a web-based website for online complaining and computerized managemen t of crime records (Khan et al., 2008).

A criminal is a popular term used for a person who has committed a crime or has been legally convicted of a crime. "Criminal" also means being connected with a crime. When certain acts or people are invol ved in or related to a crime, they are termed as criminal (Wex, 2023).

Samara City 's main police station is located in Samara City, within the Afar Regional State. It was e stablished in 1984 E.C. with the purpose of protecting local communities from criminal activities. The Samara City police station is situated near the diesel suppliers in Samara City. In the first phase, there was a small number of police members, including commanders, inspectors, and constables. But rece ntly, more than 170 police members have been employed. It is a well-organized police station that serv es in crime prevention; the detection and conviction of criminals depend on a highly responsive manner . The effectiveness of this station is based on how efficient, reliable, and fast it is. As a conseque nce, the station maintains a large volume of information. To manage their information requirements, th e station is currently using an information system. This system is manual and paper-based, where infor mation is passed hand-to-hand, and information is kept in hard-copy paper files stored ordinarily in f ili

g cabinets. Despite the relevance of their information system, it poses several challenges in the mana gement of information, including an ever-increasing paper load, difficulty in enforcing file access co

ntrols, and cases of missing files and information.

To have a peaceful life, we need a well-organized law enforcement system. In our city, Samara, we have very good facilities in the law enforcement sector. However, due to a lack of facilities, some work c annot be done in a very good way. The widely employed CMS method in Samara City is the manual process. This approach entails the use of paper files in the documentation of criminal information. For this r eason, a website will be produced for the Crime Management System. The main authority is given to the administrator. Next is the main module of the system, which is the crime module. In this way, all the crime information will be stored in the database. First, complaint details will be added to the system , and then station employees will check if the complaint is related to a crime or law and order. The r esearcher focuses on a crime management system to provide services based on a computerized or web-base d system for the main police station in Samara. It also emphasizes computerized work on many activitie s,

especially recording and reporting crime information. The researcher will help to facilitate an easy c rime management system by making it reliable and efficient by implementing the loss of many crime work s means web-based through the crime parts of the Samara City main police station.

The aim of the proposed system is to develop a system with improved facilities. The proposed system ca n overcome all the limitations of the existing system. The system provides proper security and reduces manual work.

Security of data.

Minimize manual data entry.

Better service.

User-friendly and interactive.

Minimum time required.

Changing the manual system into an automated system.

1.1. Statement of the Problem

The police station record management system is a project designed with the aim of maintaining all the records and details related to a police station in order to increase efficiency. As a result of making it easier to manage and administer a police station, this record management system makes the manageme nt and administration of a police station easier and more effective. Every country has always placed t he safety and protection of human rights at the top of its priorities, since without them no country c an exist. It is the responsibility of every country's government to protect the freedom and rights of all human beings without discrimination so that every individual can lead his life with his own choice

without violating the rules and regulations set by the government of that country (Fluchtplan erstell en, 2023).

The existing system of the Samara Police Station crime record management is a manual system. With the existing system, all activities are performed manually; there is no computerized system like a databas e or website. Files are manually stored, moved, and processed from one section to another. Reports are manually prepared and delivered to the appropriate unit. In the existing system, it's very difficult to retrieve any record information because different records are written in paper-based books or agendUserForm17 - 5 as. The problems in the existing system are:

Limitations on crime recording: Recording crime information manually.

Limitation on System Retrievals: The information is very difficult to retrieve, and finding partic ular information, like searching for crime detail information, is challenging.

Problem with information storage: The information generated by various transactions takes time and effort to be stored in the right place.

Problems with updating records: Various changes to information, like crime details, are difficult to update.

More manpower required: Many police officers are needed to handle crime.

Time-consuming: It is time-consuming to record crime.

Consumes a large volume of paperwork: it requires much paper to record a crime file.

Lack of security and space: There is no security for data because it is paper-based and has no pas sword.

Report generation latency: There is an overlap of crime records from others.

Poor inter-station sharing and connectivity.

Therefore, the main objective of this project was to solve the entire above-mentioned problem by devel oping a web-based crime management system for the Samara city police station.

1.2. Objective

1.2.1. General Objective

The general objective of the project is to develop a web based crime management system for samara city main police station.

1.2.2. Specific Objectives

The specific objectives for our project are:

Make a plan for how to carry out our project accordingly.

Gather or collect data.

Analyze the gathered data.

Design the system based on the specified requirements.

Develop an interactive user interface.

Identify the functional and non-functional requirements.

Implement the system based on the system design.

Test to check the availability of the project.

Finally, deploy the system in the working environment.

1.3. Significance of the System

The significance of this project will be:

Providing a web-based crime reporting system for police stations.

Reducing errors by suggesting appropriate actions for the recorded personal data.

Giving efficient service within the time limit.

Effective manipulation in terms of cost.

Ease of use, updating, and maintenance.

Facilitating the accessibility of information.

1.4. Data gathering

To gather accurate data from the concerned body, the researcher used the following fact-finding techni ques:

Interview: In order to gather complete and appropriate information for the proposed project, the t eam selected a person to interview about the organization, consisting of inspectors and secretaries, t o get necessary information that is stated in the background of the project, like the existing problem s and costs, such as salary.

Document Analysis: To get historical information about the organization's activities and to know t he organization's rules and regulations, the team tried to analyze as many documents as possible that were relevant to the new system.

Observation: To get first-hand, accurate information about how the existing system works, the team observed the current system directly and found the pros and cons of the present system.

1.5. Design Methodology

The team decided to use object-oriented methodology (a system development approach that allows the reu se of existing components) for the following reasons:

It is known to the group members.

It is easier to maintain.

There is ease of understanding object-oriented models due to a consistent underlying representatio n throughout the development process.UserForm17 - 6

There is ease of modification and extensibility of object-oriented models.

There is no separation between data and processes, unlike in structured analysis methodology, whic h treats data and processes separately.

From the development method, we would use prototyping, and from the testing method, we would use i ntegration and system testing.

design Tools:

Deployment Diagram

Design class diagram

1.5.1. Analysis Methodology

The analysis approach used is object-oriented analysis (OOA). This method was selected because "object -oriented analysis is a method of analysis that examines requirements from the perspectives of the cla sses and objects found in the vocabulary of the problem domain." The primary tasks in object-oriented analysis (OOA) are identifying objects, organizing the objects by creating an object-oriented model di agram, and defining the behavior of the objects. Here, common models used in OOA are use cases and obj ect models.

The team looked at the problem domain with the aim of producing a conceptual model of the information that exists in the area that will be analyzed. The team selected users who use the system and tried to refine how the users communicate with each other. This model includes the functions of the system (us e case modeling), identifies the business objects, organizes the objects, and also the relationships b etween them, and finally models the behavior of the objects.

Analysis Tools:

Class Diagram

Use case diagram

Sequence Diagram

Activity Diagram

1.5.2. Hardware and Software to Be Used for Implementation

The software requirements specification is the single most important document in the software developm ent process. The following are software requirements:

XAMPP Server, MySQL, Editor, Edraw Max and Microsoft Office Visio, Browser, Microsoft Office Word

2010, Microsoft PowerPoint 2010.

Hardware requirements are the tangible and visible components that are necessary to develop a system.

Hardware Tools that were used to develop this project are:

Computers, Flash Disk (8GB), Pen and Paper, Mobile, Camera, Hard Disk.

Chapter Two

2. System Modeling

System modeling is the process of developing abstract models of a system, with each model presenting a different view or perspective of that system. It is about representing a system using some kind of gr aphical notation, which is now almost always based on notations in the Unified Modeling Language (UML) . Models help the analyst to understand the functionality of the system and are used to communicate wi th customers.

2.1. Use Case Identification

A use case describes the functionality that a system is supposed to perform or shows by modeling. Each use case describes a possible scenario of how the external entity interacts with the system. That mea ns it interacts with the entire system for external users. In modeling use cases, each use case descri bes the interaction between the actors within the system boundary. A Use Case describes the sequence o f actions that provides a measurable value to an actor, is drawn as a horizontal ellipse, and contains the use case name inside the ellipse.

In the following table, we attempt to list the use case ID, the use case name, and its description.

Use case ID Use case Name Include/

Uc1 Create Account Login

Uc2 View User Account Login

Uc3 Update account Login

Uc4 View user Activities Login

Uc5 Take backup Login

Uc6 Restore backup Login

Uc7 Assign placement for police Login

Uc8 View employee LoginUserForm17 - 7

Uc9 View comment Login

Uc10 View nomination Login

Uc11 Post missing criminals Login

Uc12 Post notice Login

Uc13 View criminal report Login

Uc14 View placement Login

Uc15 Register criminal Login

Uc16 View nomination Login

Uc17 Send account request for complaint Login

Uc18 View order Login

Uc19 View complaint request Login

Uc20 View criminal Login

Uc21 Register complaint Login

Uc22 Order preventive police Login

Uc23 Register witness Login

Uc24 Register Accused Login

Uc25 Register Accuser Login

Uc26 Register first information report Login

Uc27 Order preventive police Login

Uc28 Register employee Login

Uc29 Update employee Login

Uc30 View employee Login

Uc31 Send complain Login

Uc32 View complain response Login

Uc33 View missing criminal ----------

Uc34 Give nomination ----------

Uc35 Give comment ----------

Uc36 Login ----------

Uc37 Logout Login

Table 1. Use Case Identification

2.2. Use Case Diagram

A UML use case diagram shows the relationships among actors and use cases within a system. A use-case diagram is a graphic representation of the interactions among the elements of a system. Use case diagr ams show the various activities the users can perform on the system. The system is something that perf orms a function. They model the dynamic aspects of the system. It deals with who uses your application or system and what they can do with it

A use case diagram contains the following sub-components:

System boundary: which defines the system of interest in relation to the world around it.

Actors: An actor is an entity that initiates the use case from outside the scope of the use case.

It can be any element that can trigger an interaction with the use case. Define the roles that users o

r other systems play while interacting with the system.

It is usually individuals involved with the system defined according to their roles.

The relationship: Communication associations connect actors with the use cases in which they participa

te. Relationships among use cases are defined by means of including and extending relationships.

It is a connection between the actors and the use cases. The Include Relationship (<<include>> or <<us

es>>) represents the inclusion of the functionality of one use case within another. The arrow is drawn

from the base use case to the used use case. The Extend Relationship (<<extend>>) represents the exte

nsion of the use case to include optional functionality.

Use Case: are the specific roles played by the actors within the system

2.2.1. Actor Specification

This part describes who the actors are and what their role is in the system. In the proposed system, t

here are eight actors who are participating. The following are the actors in the proposed system:

System Administrator: An administrator who interacts with the proposed system and has full control ove

r the system. After logging in to the system, their responsibilities include:

View User Account

Update account

View User Activities

Restore backup

Create account

View Employee

Take backupUserForm17 - 8

Police Head: Has the following activities:

Assign placement for preventive police

View Employee

View nomination

View missing criminal

Create account

View Comment

Post missing criminals

View Criminal Report

Criminal Preventive Police: Have the following activities:

View their Placement assigned by police head

Register Criminal

Register Complaint

Register Crime

View complaint request

View nomination

View notice

Send nomination

View Order

Detective Officer: Have the following activities:

View Criminal

Order preventive police

Register witness

Register accused

Register accuser

View witness

View accused

View accuser

Generate First Information Report

Human Resource Manager: Have the following activities:

Register Employee

View Employee

Update Employee

Customer: Have the following activities:

View Missing Criminal

Give nomination

Give Comment

Complaint: Have the following activities:

Send request

View response

2.2.2. Use Case Description

A use case description is a business analysis presentation of the steps defining the interactions betw
een a user (called an actor) and a system (usually a computer system). It details the interactions and
sets expectations for how the user will work within the system.

Use Case Name Register Employee

Use Case ID Uc28

include Login

Actor Human resource manager

Description The human resources manager accepts the user and registers them for the database in the sy
stem.

Precondition The users should be workers at the police station.

Basic course of Action

Actor Action

1. HR manager opens the system.

3. HR manager, click on the Register Employee Link.

5. Fill each individual field and press the register button.UserForm17 - 9

7. Use case end

System response

2. The system opens to the user page.

4. The system displays a user registration form.

6. If the user correctly fills each required field the system will display the "You are Successfully R
egistered" message.

Alternative course of action

If the HR manager enters the wrong username or password, the system displays
"Incorrect input, " and the process turns again from step 5.

Post condition Employees are legal users of the station.

Table 2. Register Employee use case description

Use Case Name Create Account

Use Case ID Uc1

include Login

Actor Administrator

Description Administrators create accounts for already-registered users.

Precondition Administrators must login and should get a list of users' information from registered users.

Basic course of Action

Actor Action

1. Administrator Login to the system

3. Click on the Create Account Link.

5. The administrator fills out the field, including the user name and password, then clicks on the Cre ate Account button.

7. Use case-end.

System response

2. The system opens to the Administrator page.

4. The system displays Create Account form

6. If the entered data is valid, the system will display the "You have successfully created an account " message.

Alternative course of action If the user enters the wrong username or password, the system displays an invalid input message and processes it again from step 4.

Post condition Users can login to the system with their account.

Table 3. Create Account use case description

Use Case Name Login

Use Case ID Uc36

Include -----

Actor Police Head, Preventive Police, Detective Officer, Human Resource Manager, Administrator, and Complaint.

Description This use case is used to ensure security for system usage. Only legal users can access the system.

Precondition The user must have a valid user name and password from Administrator.

Basic course of Action

Actor Action

1. the user opens the system.

3. User-Click Login Menu

5. The user fills out the form and clicks the login button.

7. Use case-end

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System response

2. The system displays the Home Page.

4. The system displays the login form.

6. System displays user page

Alternative course of action

The user may input the wrong user name and password and the system will display the wrong message.

The process turns back to step 5.

Post condition Users perform their own tasks on the system.

Table 4. Login use case description

Use Case Name Register Accused

Use Case ID Uc24

include Login

Actor Detective Officer

Description A detective officer can register the accused criminal to make a decision.

Precondition The detective officer must have a valid user name and password to register the accused criminal.

Basic course of Action

Actor Action

1. The user logs into the system.

3. Detective Officer, click the Register accused criminal link.

5. Fill out the form and click the Register button.

7. Use case-end.

System response

2. The user inputs the correct value, and the system displays Detective Officer Page.

4. The system displays an accused criminal register form.

6. The system displays a successful message.

Alternative course of action

The user may input the wrong user name and password, and the system will show an incorrect message.

The process turns back to step 1.

Post condition Logout from the system..

Table 5. Register Accused use case description

Use Case Name Assign placement for police

Use Case ID Uc7

include Login

Actor Police Head

Description Police Head: Assign police to their working place.

Precondition The police head must have a valid user name and password to assign police to their tas

k.

Basic course of Action

Actor Action

1. The police head logged in to the system.

3. The user clicks Assign Link.

5. Then fill out the form and click the Assign button.

System response

2. System directs to police head page

4. The system opens the form.UserForm17 - 11

6. system display successfully message

7. Use case-end.

Alternative course of action

A1. The police head may input the wrong user name and password, and the system will show an incorrect

message.

The process turns back to step 1.

A2. If the police chief enters incorrect information, the system displays an incorrect message.

The process turns back to step 5.

Post condition User's logout from the system.

Table 6. Assign Police use case description

Use Case Name Post Missing Criminals

Use Case ID Uc11

include Login

Actor Police Head

Description Police Head post the missing criminal on the home page and get a nomination from the citiz

en.

Precondition

There must have been a missing criminal nominated by the people, and

The police head must have a valid user name and password to post.

Basic course of Action

Actor Action

1. The police head logged in to the system.

3. The police head clicks on the post-missing criminal link.

5. The police head uploaded a missing criminal file.

7. Use case-end.

System response

2. system directs to the police head page.

4. The system displays browsing Button.

6. The system displays "the missing criminal successfully posted" message.

Alternative course of action A1. If the user enters the wrong username or password, the system noti

fies "the wrong input" and the process continues from step 1.

Post condition User's logout from the system.

Table 7. Post Missing Criminals use case description

Use Case Name Send complain

Use Case ID Uc31

include Login

Actor Complaint

Description The complainant sends their complaint to the preventive police, and the preventive police

examine it and send a response to the complaint.

Precondition The customer knows how to use the system.

Basic course of Action

Actor Action

1. The complaint logged in to the system.

3. Fill out the complaint form and submit it.

5. The complainant fills out the form and sends a request.

7. Use case-end.

UserForm17 - 12

System response

2. The system directs to the complaint page.

4. The system displays the form.

6. The system displays a "successfully" message.

Alternative course of action A1. If the user enters the wrong username or password, the system noti fies "the wrong input, " and the process continues from step 1.

Post condition user's logout from the system.

Table 8. Send Complaint use case description

2.3. Sequence Diagram

A sequence diagram is a kind of interaction diagram that shows how processes operate with one another and in what order in a system. It shows object interactions arranged in a time sequence. UML sequence diagrams model the flow of logic within your system in a visual manner, enabling you to both document and validate your logic. They are commonly used for both analysis and design purposes. Sequence diagra ms are the most popular UML artifact for dynamic modeling, which focuses on identifying the behavior w ithin your system.

UML Sequence Diagrams Description

Capture the interaction between objects in the context of a collaboration.

Show object instances that play the roles defined in a collaboration.

Show the order of the interaction visually by using the vertical axis of the diagram to represent time, what messages are sent, and when.

Show elements as they interact over time, showing interactions or interactions, for instance.

Figure 1. Sequence diagram for User LoginFigure 2. Sequence diagram for Give NominationFigure 3. Seque nce diagram for Assign PoliceFigure 4. Sequence diagram for Update User ProfileFigure 5. Sequence diag ram for Posts Missing CriminalFigure 6. Sequence diagram for Register EmployeeFigure 7. Sequence diagr am for View Accused Criminal

2.4. Class Diagram

This class diagram shows the detailed associations and attributes of the proposed system. A class diag ram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the st ructure of a system by showing the system's classes,

Objects

their Attributes

Operations (methods)

And the relationships among the classes

A class diagram is an illustration of the relationships and source code dependencies among classes in the Unified Modeling Language (UML). It provides an overview of the target system by describing the ob jects and classes within the system and the relationships between them.

Figure 8. Crime Management Class Diagram

Chapter Three

3. System Design

System design is the transformation of the analysis model into a system design model. System design is the first part to get into the solution domain in software development. This chapter focuses on trans forming the analysis model into a design model that takes into account the non-functional requirements and constraints described in the problem statement and requirement analysis sections discussed earlie r.

3.1. Design Goal

The objectives of design are to model the system with high quality. The design goals are derived from non-functional requirements, which means a non-functional requirement is the description of the featur e characteristics and attributes of the system as well as any constraints that may limit the boundary of the proposed solution.

3.2. System Decomposition

To reduce the complexity of the solution domain, we decompose a system into simpler parts, called subs ystems, which are made of a number of solution domain classes. In the case of complex subsystems, we r ecursively apply this principle and decompose a subsystem into a set of loosely dependent parts that m ake up the system. Subsystem decomposition is the way that helps us to distinguish the parts of the op erations that take place within the organization

Figure 9. System decomposition

3.3. System Architecture

The purpose of design is to show the direction in which the application is being developed and to obta in clear and sufficient information needed to derive the actual implementation of the application. The work is based on the services provided on the internet to customers. Once the services are available UserForm17 - 13

based on customer requests, they will be delivered with specific privileges to access, receive, and vi sit the site. The architecture used for the system is a client-server architecture where a client can use internet browsers to access the web-based crime file management system within the local area netwo rk of the agency or anywhere using the internet. It stores this data in a relational database manageme

nt system. The middle tier (web/application server) implements the business logic, controller logic, a nd presentation logic to control the interaction between the application's clients and data. The contr oller logic processes client requests, such as requests for reservations and show services provided by th

e printing enterprise system from the database.

Figure 10. System Architecture

3.4. Component Diagram

Component modeling shows which components or objects will be accessed by the user. In this modeling of the system's components, it will be shown that there is a relationship among components.

By this diagram, components of the system will be wired, showing that there is a relationship among co mponents: management of the system, database operations performed on databases, and security issues.

Figure 11. Component diagram

3.5. State Chart Diagram

A state chart diagram describes the flow of control of the Samara police station criminal management p roposed system from one state to another to describe the system dynamically. States are defined as a c ondition in which an object exists and changes when some event is triggered. So the most important pur pose of a state chart diagram is to model the life of an object from creation to termination

Figure 12. State Chart Diagram for LoginFigure 13. State Chart Diagram for Update Criminal StatusFigur e 14. State Chart Diagram for Add Criminal InformationFigure 15. State Chart Diagram for View Post Cri minalFigure 16. State Chart Diagram for Update ProfileFigure 17. State Chart Diagram for Register Empl oyee

3.6. Deployment Diagram

A deployment diagram shows the execution architecture of systems that represent the assignment (deploy ment) of software artifacts to deployment targets (usually nodes). Nodes represent either hardware dev ices or software execution environments.

Deployment diagrams are used to model the hardware that will be used to implement the system, the link between different items of hardware, and the deployment of software on that hardware.

Through the deployment diagram, we are able to model:

Where hardware Is located

Where software Is located

What the communication path is between various hardware parts

Deployment Diagram Description:

Browser: Online viewers will be able to communicate with the web server using a browser.

Web Server: Using Apache as the web server, it will be responsible for accepting and responding to req uests sent by the browsers.

Database: This will be responsible for storing information on the computer.

Figure 18. Deployment Diagram

3.7. Persistence Data Management

The persistent data model describes the persistent data stored by the system and the data management i nfrastructure required for it. This section typically includes the description of data schemas, the se lection of a database, and the description of the encapsulation of the database. Here, as the system i ncludes a large amount of data received from users and is implemented in large organizations, it needs persistent data storage. Therefore, our software system uses a database called SQL Server to manage a nd store data persistently. Information related to admin, preventive officer, case, news, feedback, an d others is persistent data and is hence stored on a database management system. Moreover, storing dat a in a database enables the system to perform complex queries on large data sets. In order to store da ta persistently in a database, those class objects identified in the class diagram of CMS are mapped i nto tables, and the attributes are mapped into fields for the respective tables. The tables of the sys tem

with their respective fields and the relationships that exist between the tables are expressed in thi s portion of the project.

Figure 19. Persistence data management

3.8. Access Control and Security

In these aspects of the system design issues of the Samara police station crime management system, we are concerned about two things: protecting the system from external threats and ensuring that the norm al day-to-day operation of the system processes data in a controlled manner. Therefore, we are focusinUserForm17 - 14

g on the design to ensure the secure operation of the information system and safeguard the information and assets stored in it so that the Samara police station crime management system runs properly. This means that in the design, we are concerned with information security and application controls.

Actors

Administrator Customer Preventive Police Detective Officer Police Head Complaint HR Manager

Manage account Order police Assign placement

Create account

-Give comment

-Give nomination

Give nomination

-View-user activity

-View Employee

View missing person

-View missing person

-View complaint

-View order

-View placement

-View notice

-View criminal

-View nomination

-View accused

-View FIR

-View criminal

-View missing person

-View placement

-View response

-View criminal report

-View missing person

-View response

-View Employee

Take backup

Send account request

Send request Update Employee

-Post notice

-Post missing person

-Register criminalUserForm17 - 15

-Register crime

-Register complaint

-Register accuser

-Register accused

-Register witness

-Register FIR

Register Employee

Table 9. Access control and security for WBCMS

3.9. User Interface

User interface design is the design of a system with a focus on the user's experience and interaction. The main goal of user interface design is to make the user's interaction as simple and efficient as p ossible.

In this system, users would communicate with the system through the following user interface elements: links, buttons, forms, and pictures that are described under the system. The following interface desi gn describes the logical characteristics of some interfaces between the system and the users.

Figure 20. Home Page user interfaceFigure 21. Police Head Post Notice Form user interfaceFigure 22. De tective Officer Accuser Registration Form user interfaceFigure 23. Complaint Page user interface

Chapter Four

4. Implementation and Testing

4.1. Implementation Overview

Implementation is the execution of any idea, model, or method in information technology. It refers to the process of setting up new software and hardware after a purchase is made. Implementation in the sy stem includes implementing the attributes and methods of each object and integrating all the objects i n the system to function as a single system. The implementation activity spans the gap between the det ailed object design model and a complete set of source code files that can be compiled together.

The objective of the system implementation phase is to convert the final physical system specification into working and reliable software and hardware, document the work that has been done, and provide he lp for current and future users.

While we were thinking about developing this web-based application system, we encountered a number of constraints, but the following are the most common:

Lack of fast internet access

Lack of time

Lack of resources such as computers, laptops, etc.

converting a logical design into an application using selected programming languages. To develop this project, the team members used the following programming languages: PHP, HTML, JavaScript, and CSS.

PHP is a server-side scripting language that is embedded in HTML. It is used to manage dynamic content , databases, session tracking, and even to build entire e-commerce sites.

It is integrated with a number of popular databases, including MySQL, PostgreSQL, Oracle, Sybase, Info rmix, and Microsoft SQL Server.

4.2. Algorithm Design

An algorithmic view of a problem gives insight that may make a program simpler to understand and to wr ite. Every algorithm needs a process in order to be created and utilized, and they need the four stage s of algorithm analysis: design, implement, and experiment.

4.3. Sample Code and Description

```
<? php
session_start();
include("connection.php");
?>
<!DOCTYPE html>UserForm17 - 16
<html>
<head>
<title>home page</title>
<link href="css/mystylesheethome.css" rel="stylesheet" type="text/css"/>
</head>
<body>
<div id="wrapper">
<table width="100%" cellspacing="0px">
<tr>
<td>
<div id="header">
<? php
require("header.php");
?>
</div>
</td>
</tr>
<tr>
```

```
<td>
<div id="headermenu">
<? php
require("headermenu.php");
?>
</div>
</td>
</tr>
</table>
<div id="maincontent">
<table width="100%">
<tr>
<td>
<div id="ContentLeft">
<? php
require("homesidemenu.php");
?>
</div>
</div>UserForm17 - 17
</td>
<td>
<div id="ContentCenter">
<div style="border:solid 4px #dldbeg;overflow:scroll;overflow-y: scroll">
<? php
// require("Animation.php");
?>
<h1 style="color:blue; font-size: 25px;"> SAMARA CITY MAIN POLICE STATION</h1>
<p> <mark> Samara city main police station</mark> is a building that serves to accommodate police offi
cers and other members of staff. These buildings often contain offices and accommodations for personne
l and vehicles, along with locker rooms, temporary holding cells, and interview and interrogation room
s. </p>
<center> <h2 style="margin-left: 40px; color:blue"> LOCATION<h2></center>
```

 <mark> Samara city main police station</mark> is found in Samara city, which is located in <mark>
Afar Regional State. </mark> It was established in 1984 E.C. for the purpose of protecting local commu
nities from criminal activities. <mark>Samara city police station</mark> found near the diesel supplie
rs in Samara city.

```
</div>
<div>
<img src="images/compound.jpg" width="95%" height="300px">
</div>
</div>
</td>
<td>
<div id="ContentRight">
<? php
require("login.php");
?>
</div>
</td>
</tr>
</table>
</div>
<!-- footer-->
<div id="footer">
<? php
require("footer.php");
?>
</div>UserForm17 - 18
<!--end of main wrapper-->
</div>
</body>
</html>manangemnt system information / school attendence register Use case ID Use case Name Include/
Uc1 Create Account
Login
```

Uc2 View User Account

Login

Uc3 Update account

Login

Uc4 View user

Activities Login

Uc5 Take backup

Login

Uc6 Restore backup

Login

Uc7 Assign placement for

police Login

Uc8 View employee

Login

Uc9 View comment

Login

Uc10 View nomination

Login

Uc19 View complaint

request Login

Uc11 Post missing

criminals Login

Uc20 View criminal

Login

Uc12 Post notice

Login

Uc13 View criminal report

Login

Uc21 Register complaint

Login

Uc14 View placement

Login

Uc15 Register criminal

Login

Uc16 View nomination

Login

Uc17 Send account

request for complaint

Login

Uc18 View order

Login

Uc22 Order preventive

police Login

Uc24 Register

Accused Login

Uc25 Register Accuser

Login

Uc26 Register first

information report Login

Uc27 Order preventive

police Login

Uc23 Register witness

Login

Frame1

ok

cancel

Tab1

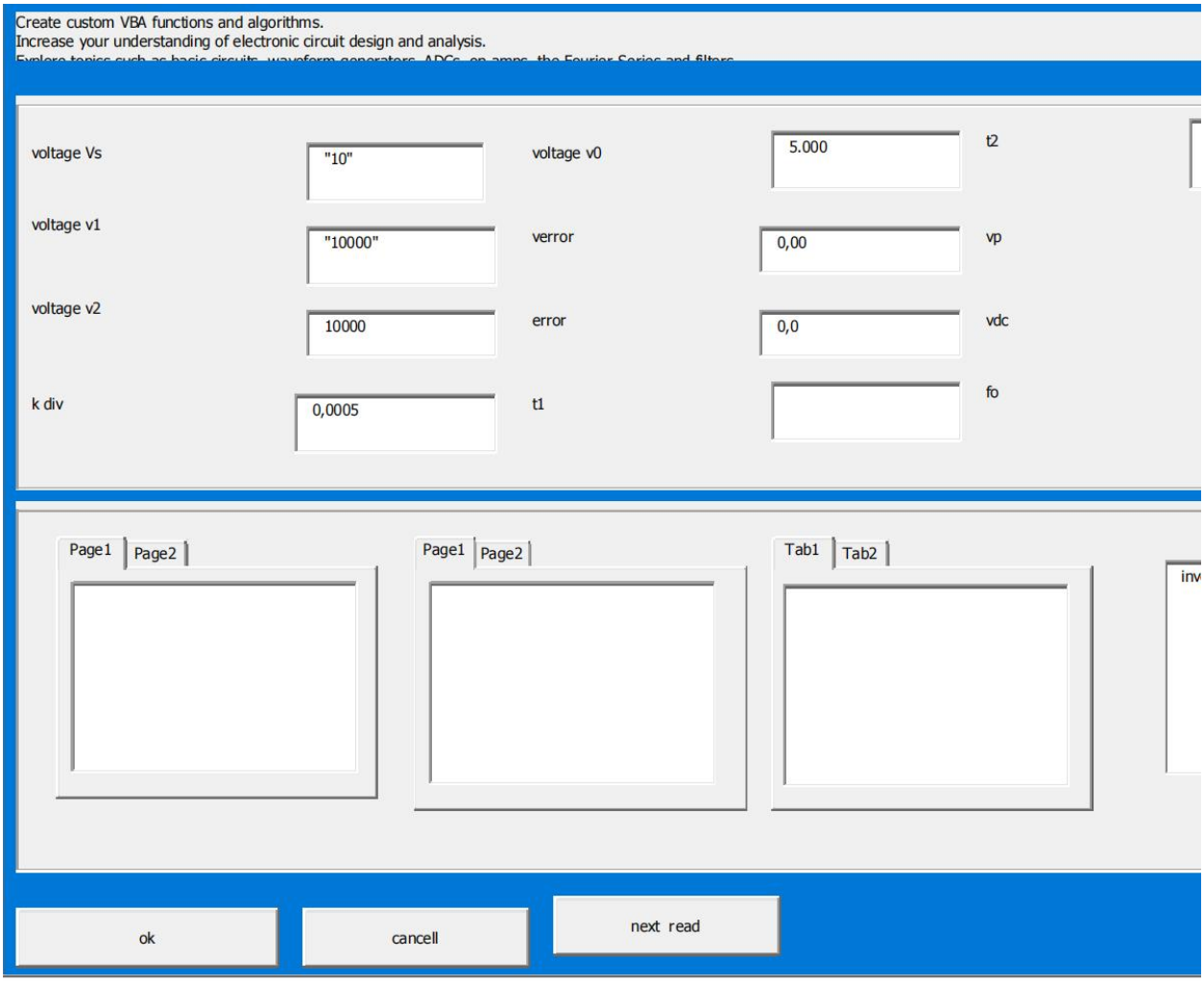
Tab2

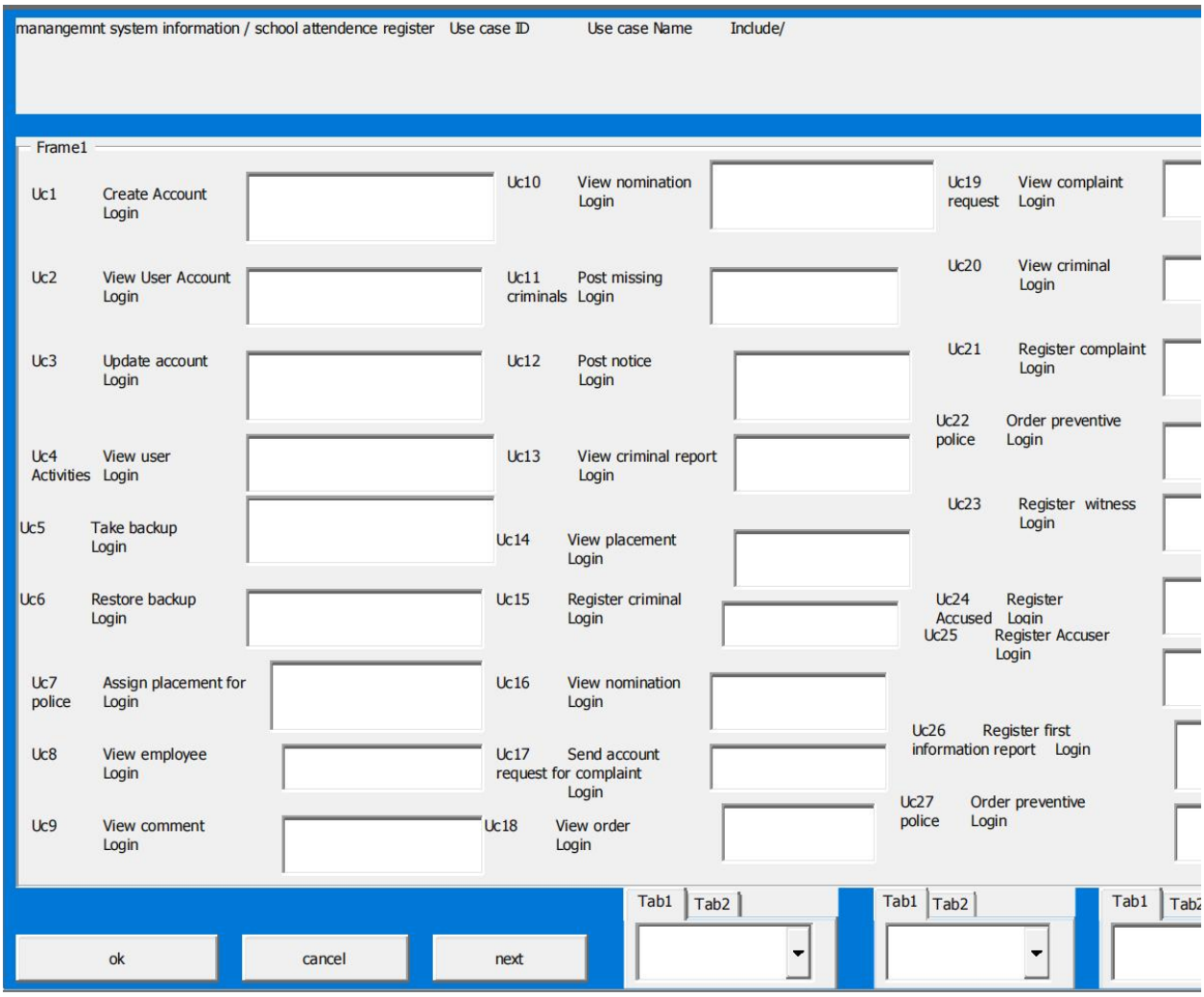
Tab1 Tab2

Tab1

Tab2

next


Create custom VBA functions and algorithms.
Increase your understanding of electronic circuit design and analysis.
voltage Vs
"10"
voltage v0
5.000
t2
voltage v1
"10000"
verror
0,00
vp
voltage v2
10000
error
0,0
vdc
k div
0,0005
t1
fo
Page1
Page2
Page1
Page2
Tab1
Tab2
ok
cancell
next read


manangemnt system information / school attendence register
Use case ID
Use case Name
Include/
Frame1
Uc1 Create Account Login
Uc2 View User Account Login
Uc3 Update account Login
Uc4 Activities View user Login
Uc5 Take backup Login
Uc6 Restore backup Login
Uc7 police Assign placement for Login
Uc8 View employee Login
Uc9 View comment Login
Uc10 View nomination Login
Uc11 criminals Post missing Login
Uc12 Post notice Login
Uc13 View criminal report Login
Uc14 View placement Login
Uc15 Register criminal Login
Uc16 View nomination Login
Uc17 Send account request for complaint Login
Uc18 View order Login
Uc19 request View complaint Login
Uc20 View criminal Login
Uc21 Register complaint Login
Uc22 police Order preventive Login
Uc23 Register witness Login
Uc24 Accused Register Login
Uc25 Register Accuser Login
Uc26 Register first information report Login
Uc27 police Order preventive Login
Tab1
Tab2
ok
cancel
next

```
Private Sub Label1_Click()

End Sub

Private Sub TextBox21_Change()

End Sub

Private Sub TextBox22_Change()

End Sub

Private Sub TextBox23_Change()

End Sub

Private Sub TextBox24_Change()

End Sub

Private Sub TextBox3_Change()

End Sub

Private Sub TextBox5_Change()

End Sub
```

```
Private Sub TextBox7_Change()

End Sub

Private Sub TextBox8_Change()

End Sub

Private Sub TextBox9_Change()

End Sub

Private Sub TextBox9_DblClick(ByVal Cancel As MSForms.ReturnBoolean)

End Sub

Private Sub TextBox9_DropButtonClick()

End Sub

Private Sub TextBox9_Enter()

End Sub

Private Sub TextBox9_Error(ByVal Number As Integer, ByVal Description As MSForms.ReturnString,
ByVal SCode As Long, ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, ByVal
CancelDisplay As MSForms.ReturnBoolean)
```

```
End Sub

Private Sub TextBox9_Exit(ByVal Cancel As MSForms.ReturnBoolean)

End Sub

Private Sub TextBox9_KeyDown(ByVal KeyCode As MSForms.ReturnInteger, ByVal Shift As Integer)

End Sub

Private Sub TextBox9_KeyPress(ByVal KeyAscii As MSForms.ReturnInteger)

End Sub

Private Sub TextBox9_MouseDown(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single,
ByVal Y As Single)

End Sub

Private Sub TextBox9_MouseMove(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single,
ByVal Y As Single)

End Sub

Private Sub TextBox9_MouseUp(ByVal Button As Integer, ByVal Shift As Integer, ByVal X As Single, ByVal
Y As Single)

End Sub

Private Sub UserForm_Click()
```

End Sub

End Sub

frm

End Sub

frm

End Sub

Command = True

End Sub

Command ok = True

End Sub

Command Cancel = True

End Sub

Command 3 = ok

End Sub

tab1 = True

End Sub

Page = True

End Sub

toggle = 1

End Sub

Text = True

End Sub

textbok = True

End Sub

Label = True

End Sub

Text = Label

combo Text = True

will = True

Strings = True

Endsub

Show form

Show Sheet

Show Module

Show class

Else

End Sub

operand operand = True

Picture = True

Table = True

Scroll bar = True

Print

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22 Aug 2025

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Here's a quick breakdown of what you've achieved and how you might leverage it further:

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Title: Drawing Analyse Design System **Author(s):** Tshingombe Tshitadi (dual affiliation) **Published:** 15 August 2025 **Affiliations:**

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🔍 Abstract & Keywords

Though the abstract is brief, the keywords—*policy, engineering, electrical, rural system, discovery*—signal your core themes:

- **Policy Integration**: Bridging SAQA/NQF standards with engineering diagnostics

- **Rural Systems**: Designing fault-tolerant infrastructure for underserved regions
- **Discovery**: Experimental learning and system modeling as career development tools

Strategic Next Steps

Here's how you can build on this achievement:

1. Portfolio Integration

- Add this publication to your LMS profile and digital portfolio
- Tag it with WA codes and SAQA descriptors for credential visibility
- Use it as a reference artifact in educator training or grant proposals

2. Curriculum Mapping

- Scaffold the paper into a course module: *"Drawing Systems for Rural Infrastructure"*
- Include annotated schematics, fault analysis logs, and compliance rubrics
- Align with trade theory and experimental learning outcomes

3. Peer Engagement

- Share the open-access link with your network across DHET, Peace College, and Sci-Bono
- Invite commentary or collaboration for a follow-up publication or workshop
- Consider submitting a companion piece to an engineering education journal

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